The Infantry School

MAILING LIST

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Containing the Latest Thought on Infantry

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PREFACE

This volume of The Infantry School Mailing List contains material contributed by the following infantry officers:

Major Claud E. Stadtman
Major Eugene M. Landrum
Major John T. Murray
Major Frederick Irving
Major Raymond G. Lehman
Captain W llam A. Marsh
Captain William H. Schildroth
Captain Wendell G. Johnson

Major John H. Burns, assisted by Major Elliot D. Cooke and Captain Wendell G. Johnson, edited this volume.

The drawings, map reproductions, printing, and binding are the work of the enlisted personnel of The Infantry School Reproduction Plant, supervised by Captain George C. Mergens.

C. F. THOMPSON,
Colonel, Infantry,
Assistant Commandant,
The Infantry School.

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CHAPTER 1

(INFANTRY SCHOOL TEACHING)

Antiaircraft Marksmanship—Rifle and Automatic Rifle

(This chapter outlines a new course of antiaircraft marksmanship with rifle and automatic rifle which has been used with success at The Infantry School. It is offered to the infantry at large with the idea that it may be of help in training in this subject until such time as the new authorized course is promulgated by the War Department.—EDITOR.)

SECTION I

GENERAL

1. *OBJECT OF INSTRUCTION.*—The object of rifle and automatic rifle antiaircraft marksmanship instruction is to train the soldier in the technique of firing at rapidly-moving, aerial targets.

2. *BASIS OF INSTRUCTION.*—*a.* Prior to instruction in antiaircraft marksmanship the soldier should have completed a course of training in rifle marksmanship and thereby acquired the fundamentals of good shooting. To become a good antiaircraft marksman he must be able to apply the fundamentals of target practice to firing at rapidly-moving targets and to perform the following

operations with accuracy and precision:

(1) Apply the length of the target as a unit of measure in measuring the required lead.

(2) Rapidly align the sights of the rifle on the required lead.

(3) Swing the rifle with a smooth, uniform motion so as to maintain the aim on the required lead while getting off the shot.

(4) Properly apply the trigger squeeze so as to get the shot off in a minimum of time and without disturbing the aim.

b. The correct performance of these four operations combined into one continuous smooth motion when firing in any direction at rapidly-moving aerial targets is the basis for the course of training outlined herein.

3. *LEADS.*—In order to hit a moving airplane, except in the case of a direct dive, or a target receding from a direct dive, it is necessary to aim ahead of the target. The distance the aim is directed ahead of the target is expressed in units of target length and is called "lead". The number of target-length leads used in firing at a moving target is dependent upon the speed of the plane, the range, and the time of flight of the bullet from the muzzle of the rifle to the target.

4. *CLASSIFICATION OF TARGETS.*—*a.* When hostile aircraft are reconnoitering, taking photographs, spotting for artillery, or maneuvering to attack and attacking ground units, they are targets for rifle and automatic rifle fire.

b. Overhead and non-overhead.—For all practical purposes hostile airplanes and the targets used in this manual to represent them, and their courses, are, from a rifleman's viewpoint, divided into:

(1) *Overhead.*—Those that will apparently pass over or nearly over the rifleman's head.

(2) *Non-overhead.*—Those that will apparently not pass over the rifleman's head.

c. Diving, horizontal, and climbing.—Both overhead and non-overhead targets and their courses fall into these three further classifications.

(1) *Diving.*—Those whose altitude is decreasing.

(2) *Horizontal.*—Those moving parallel or nearly parallel to the ground.

(3) *Climbing.*—Those whose altitude is increasing.

d. Direct diving.—In addition to the foregoing, a target whose course is directly toward the rifleman, or nearly so, from a higher altitude, is called a *direct diving target.* A target whose course is directly away from the rifleman after diving toward him is referred to as receding from a direct dive.

e. Approaching and receding.—Antiaircraft targets and courses, whether overhead or non-overhead, are also further designated as—

(1) *Approaching.*—Those whose range is decreasing.

(2) *Receding.*—Those whose range is increasing.

f. Other descriptive terms.—From the infantry viewpoint hostile targets are also described as *low* or *high.* A *low* target is an airplane flying close to the ground.

5. *SEQUENCE OF TRAINING.*—Antiaircraft rifle and automatic rifle marksmanship is divided into preparatory exercises, .22 caliber range practice, and towed-target firing.

SECTION II

PREPARATORY EXERCISES

6. *PREPARATORY EXERCISES.—a. General.*—The preparatory exercises are designed to teach the soldier the correct method of doing each of the fundamentals of antiaircraft rifle marksmanship and to drill him therein until the correct procedure becomes a fixed habit. In addition to a brief explanation of the theory of antiaircraft rifle fire the preparatory exercises consist of the following three distinct steps which should be completed

on each of the targets described hereafter prior to firing on those targets:

(1) Position exercise.
(2) Aiming and leading exercise.
(3) Trigger-squeeze exercise.

b. Methods.—A conference by the instructor should precede each exercise. This conference should contain an explanation of the necessity for the exercise, and demonstrations by the instructor and a qualified squad. In order to awaken interest and stimulate the soldier's enthusiasm, the preliminary instruction should be individual and

FIGURE 1a.—Organization for training; non-overhead target.

thorough. Each man should understand and be able to explain each point.

c. Coaching.—The coach and pupil method should be carried on throughout the training. During all preparatory exercises and instruction firing when a man is in a firing position he should have a coach whose duty it is to watch him and point out errors. For this purpose the soldiers should be grouped in pairs and take turns in acting as coach and pupil. Unit leaders are the instructors and should supervise and prompt the coaches.

7. *ORGANIZATION.*—With the targets and target range described hereinafter (see Section VII Figure 18) a four-squad group per target is the most economical training unit. For the preparatory exercises this will permit sixteen men to perform the exercises on each type

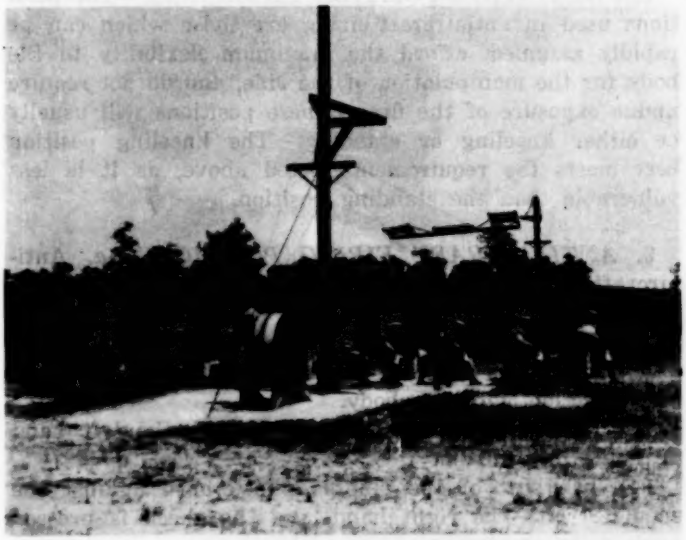

FIGURE 1b.—Organization for training; overhead target.

of target while the remaining sixteen men act as coaches. Each group of four squads should complete all preparatory training and instruction firing on its assigned target. Groups should then change places. The preparatory training and instruction firing should then be undertaken on the new type of target. This procedure should be followed

until each man of each group has completed his instruction on each of the four types of targets.

SECTION III

FIRST STEP—POSITION EXERCISES

8. *FIRST STEP—POSITION EXERCISES.*—The positions used in antiaircraft firing are those which can be rapidly assumed, afford the maximum flexibility to the body for the manipulation of the rifle, and do not require undue exposure of the firer. These positions will usually be either kneeling or standing. The kneeling position best meets the requirements listed above, as it is less vulnerable than the standing position.

9. *ANTIAIRCRAFT FIRING POSITIONS.*—*a.* Antiaircraft firing positions differ from those used in ground target firing in that—

(1) The sling is not used.

(2) The arms are not supported but move freely in any direction with the body.

(3) The hands grasp the piece firmly, the left hand near the lower band.

(4) The butt of the rifle is pulled hard against the shoulder with the right hand, and the cheek is pressed against the stock.

(5) In the kneeling position the buttock does not rest on the heel, and the left foot is well advanced to the left front. The weight is slightly forward.

b. The positions must be such that the rifle, the body from the waist up, the arms, and the head are as one fixed unit.

c. When leading a target the rifle must be swung with a smooth uniform motion. This is accomplished by pivoting the body at the waist. There should be no independent movement of the arms, the shoulders, the head, or the rifle.

FIGURE 2.—Rifleman in antiaircraft kneeling position.

d. The instructor explains and demonstrates the position and points out that if the rifle is pulled or pushed in the desired direction by means of the left hand and arm, the rifle will move with a jerky motion, thereby

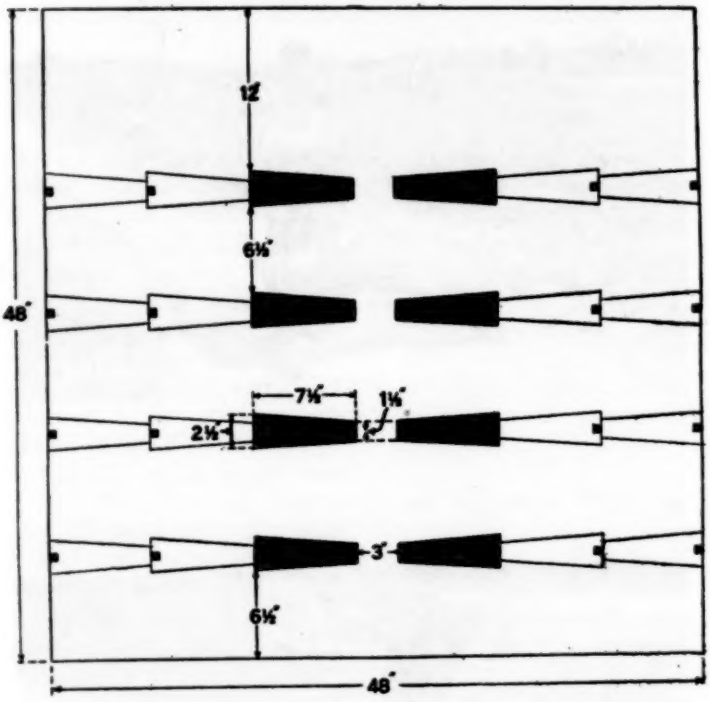

FIGURE 3a.—Non-overhead aiming and leading target.

increasing the possibility of jerking the trigger, or the front sight may be pulled or pushed out of alignment with the rear sight and the eye.

e. Position exercises should be conducted so that the soldier will become proficient in rapidly assuming positions for firing at hostile aircraft moving in any direction.

SECTION IV

SECOND STEP—AIMING AND LEADING EXERCISES

10. *SECOND STEP—AIMING AND LEADING EXERCISES.—a. Purpose.*—The purpose of the aiming and leading exercises is to reach the correct method of aiming and to develop skill in swinging the rifle with a smooth uniform motion so as to maintain the aim on aerial targets.

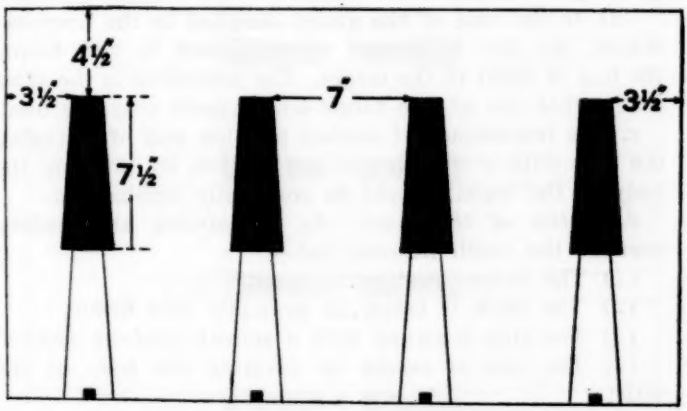

FIGURE 3b.—Overhead aiming and leading target.

b. Method.—(1) In the case of the groups assigned to the non-overhead targets, the pupils, in the standing ready position, are placed in one line at about 1½ yards intervals, 500 inches from and facing the assigned target. The coaches take position so they can observe the pupil. The commands for the exercise are: 1. *Aiming and leading exercise.* 2. *One (two, or three) target-length leads.* 3. *Targets.* At the command *targets,* the targets are operated at a speed of from 15 to 20 feet per second; the pupils rapidly assume the kneeling firing position, align the sights on the spotter indicating the proper lead, and take

up the slack in the trigger; then swing the rifle with a smooth uniform motion by pivoting the body at the waist, and maintain the aim on the proper lead during the travel of the target. The operation is repeated as the target is moved in the opposite direction. The exercise is continued until the target has been moved five times in each direction. The coach and pupil then change places and the exercise is continued until all men have acquired some skill in aiming and leading with one, two, and three target-length leads, both from right to left and left to right.

(2) In the case of the group assigned to the overhead target, the line is formed perpendicular to and facing the line of flight of the target. The procedure is the same except that one or two target-length leads only are used.

c. The importance of correct position and of swinging the rifle with a smooth uniform motion, by pivoting the body at the waist, should be constantly emphasized.

d. Duties of the coach.—In the aiming and leading exercise the coach insures that—

(1) The proper position is taken.

(2) The slack is taken up promptly and firmly.

(3) The rifle is swung with a smooth uniform motion.

(4) The rifle is swung by pivoting the body at the waist.

(5) The arms, shoulders, rifle, and head move as a unit as the rifle is swung.

SECTION V

THIRD STEP—TRIGGER SQUEEZE EXERCISES

11. *IMPORTANCE.*—*a.* Correct trigger squeeze is the most important operation to be performed in firing any weapon that is aimed and supported by the firer. The rifleman should be trained to squeeze the trigger exactly as when firing rapid fire at stationary targets, except that the rifle is kept in motion during the trigger squeeze, while firing the shot, and momentarily after firing the shot.

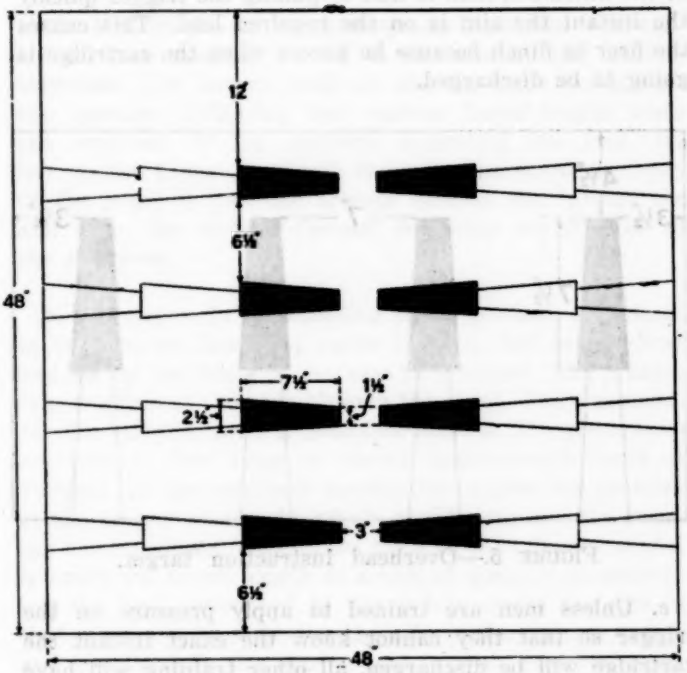

FIGURE 4.—Non-overhead instruction target.

b. In firing at a rapidly-moving target the untrained man has a tendency to permit the rifle to come to rest momentarily while applying the final squeeze. This results in the shot going behind the target. Another fault of the untrained man is that of pulling the trigger quickly the instant the aim is on the required lead. This causes the firer to flinch because he knows when the cartridge is going to be discharged.

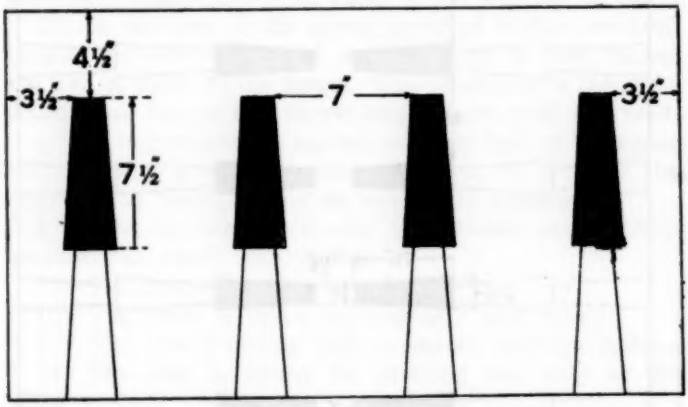

FIGURE 5.—Overhead instruction target.

c. Unless men are trained to apply pressure on the trigger so that they cannot know the exact instant the cartridge will be discharged, all other training will have been a waste of time.

d. Due to the short period of time during which the usual aerial target will be within effective range, fire should be opened as soon as possible and delivered at as rapid a rate as possible consistent with accuracy. The trigger should therefore be squeezed aggressively and decisively. Once started, the squeeze should be continued until the rifle is fired.

12. *OBJECT.*—The object of the trigger-squeeze exercises is to train the rifleman to apply pressure on the

trigger while keeping the rifle in motion, to develop a decisive trigger squeeze so that he can open fire in a minimum of time without loss of accuracy, and to train him to follow through with the shot.

13. *METHOD.—a.* Trigger-squeeze exercises are conducted in a manner similar to the aiming and leading exercises. The targets used are also the same except that the spotters indicating the various target-length leads are removed. If the spotters, indicating the lead, are left on the target they will cause an increased tendency of the pupil to pull the trigger quickly the instant the aim is on the spotter, thereby defeating the purpose of the exercises.

b. The pupils, in the standing ready position, are placed in one line at about 1½ yards interval, 500 inches from and facing the assigned non-overhead target. The coaches take position so they can observe the pupil. The commands for the exercise are: 1. *Simulate load.* 2. *Trigger-squeeze exercise.* 3. *One* (*two or three*) *target-length leads.* 4. *Targets.* At the command *targets,* the targets are operated at the proper speed; the pupils rapidly assume the kneeling firing position, take up the slack in the trigger, mentally apply the target length as a unit of measure in measuring the lead announced in the order; direct the aim on that point and by swinging the rifle in the manner taught and practiced in the aiming and leading exercise, maintain the aim at the proper lead at the same time applying a constantly increasing pressure on the trigger, until the striker is released. The aim and pressure on the trigger is maintained during the entire length of travel of the target regardless of release of the striker. The importance of following through with the shot cannot be too strongly emphasized. It is only by this means that men will develop the habit of keeping the rifle in motion during the entire process of firing. All of these steps are performed as one continuous operation. The exercise consists of squeezing the trigger each time the target moves

across the front. The exercise consists of five passages of the target in each direction. The coach and pupil then change places and the work is continued until all men have become proficient in squeezing the trigger correctly, using various target-length leads.

c. The procedure for overhead trigger squeeze exercise is the same except that the line is formed perpendicular to and facing the flight of the target and one or two target-length leads only are used.

14. *DUTIES OF THE COACH.*—In the trigger squeeze exercise the coach sees that—

(1) The proper position is taken.

(2) The slack is taken up promptly and firmly.

(3) The rifle is swung with a smooth uniform motion.

(4) The rifle is swung by pivoting the body at the waist.

(5) The arms, shoulders, rifle, and head move as a unit as the rifle is swung.

(6) The pressure on the trigger is applied promptly, aggressively, decisively, and continuously.

(7) The eye is kept open and does not blink at the instant the striker falls.

(8) The muzzle does not jerk coincident with the release of the striker.

(9) The pupil continues the aim and trigger pressure during the entire length of travel of the target.

15. *TRIGGER SQUEEZE.*—Skill in squeezing the trigger properly when firing at rapidly-moving targets is difficult to acquire. Although men will have had training in trigger squeeze during their course in stationary target marksmanship, firing at rapidly-moving targets introduces certain additional elements which must be mastered before skill is acquired. The greater part of the time allotted to preparatory exercises should therefore be devoted to trigger-squeeze exercises.

SECTION VI

RANGE PRACTICE—CALIBER 0.22

16. *GENERAL.—a.* Range practice is divided into three parts—instruction firing, record firing, and squad or group firing.

b. All firing is on moving targets on the 500-inch range. A suggested arrangement of the range is shown in Figure 18. Provision is made for simultaneous firing by separate groups on the horizontal, the diving, the climbing, and the overhead targets. The course should first be fired with the caliber 0.22 rifles after which, if ammunition and danger area will permit, the caliber 0.30 is used.

c. When applicable the rules and regulations prescribed in Chapter 1, Part One, Basic Field Manual, Volume III (Rifle Marksmanship), will govern the range practice prescribed herein.

d. As a preliminary to firing, all apparatus, targets and equipment should be inspected to insure the expeditious and efficient conduct of this phase of the training.

e. All rifles should be targeted before range practice starts.

17. *SAFETY PRECAUTIONS.—a.* Bolts of rifles should be open at all times except when firing or simulating firing.

b. Rifles should be loaded only at the command of the officer in charge of the firing on that target.

c. At the completion of the firing of a score all rifles should be unloaded and bolts opened. All rifles should be left on the firing line as the firers go forward to score and mark targets.

d. Target operators should remain behind the protective wall except when ordered by the officer in charge to leave.

18. *INSTRUCTION FIRING (Caliber 0.22).—a.* The purpose of instruction firing is to provide a means of

applying to actual firing the principles taught in the preparatory exercises. During instruction practice the soldier works under the supervision of a coach.

b. As each group completes the preparatory training on a target, instruction firing should be taken up on that target and completed before groups change targets.

c. Instruction practice consists of the firing indicated in Table I.

d. As the instruction firing on each type of target follows immediately after the preparatory exercises on that target, the organization of the training unit should be the same that given in paragraph 7.

(1) The front rank of each squad is formed on the line in the kneeling firing position. The rear rank acts as coaches.

(2) The front rank of two of the squads fires while the remaining front rank men simulate firing.

(3) Silhouettes are assigned to each individual firer.

(4) Men assigned to silhouettes on the right half of the non-overhead types of targets fire one round each time the target crosses from their left to right. The men assigned to silhouettes on the left half of the same targets fire one round each time the target crosses from their right to left.

(5) Men assigned to silhouettes on the overhead type of target first fire one round each time the target is run in the approaching direction.

(6) Five rounds constitutes a score. After each string of five rounds, targets are scored and shot-holes penciled.

(7) Each succeeding score is fired in the same manner as the preceding score, except that the targets move in the opposite direction and silhouette assignments are changed where necessary, and that the squads alternate scores in firing and simulating firing.

(8) One point is awarded for each hit in the silhouette when using one target-length lead or in the proper scoring space when firing with more than one target-length lead.

(9) Upon completion of the firing prescribed in Table I for any one type of target the group changes targets

and continues until all have completed the instruction practice.

(10) After some experience the above method may be modified by the assignment of appropriate silhouettes to each man and the firing of one round each time the target crosses the range in either direction.

TABLE I—INSTRUCTION FIRING
(Range 500 inches)

TARGET	ONE LEAD 10 Rounds	TWO LEADS 10 Rounds	THREE LEADS 10 Rounds	TOTAL
Horizontal	5 Rds R to L 5 Rds L to R	5 Rds R to L 5 Rds L to R	5 Rds R to L 5 Rds L to R	30
Climbing	5 Rds R to L 5 Rds L to R	5 Rds R to L 5 Rds L to R	5 Rds R to L 5 Rds L to R	30
Driving	5 Rds R to L 5 Rds L to R	5 Rds R to L 5 Rds L to R	5 Rds R to L 5 Rds L to R	30
Overhead	5 Rds Approaching 5 Rds Receding	5 Rds Approaching 5 Rds Receding		20

Speed of all targets 15 to 20 feet per second. Total rounds: 110.

19. *RECORD FIRING (Caliber 0.22).—a.* Record practice is the test of the skill of a rifleman in firing at antiaircraft targets. Coaching is prohibited.

b. The procedure governing instruction firing is applicable to record firing. Each group completes the prescribed course of fire on each target before changing targets.

c. The course to be fired is prescribed in Table II.

d. Each target is passed five times in the direction indicated in Table II, one round being fired upon it each time. These five rounds are then scored and the bullet holes marked with a colored pencil. This process is repeated with the targets being passed in the opposite direction.

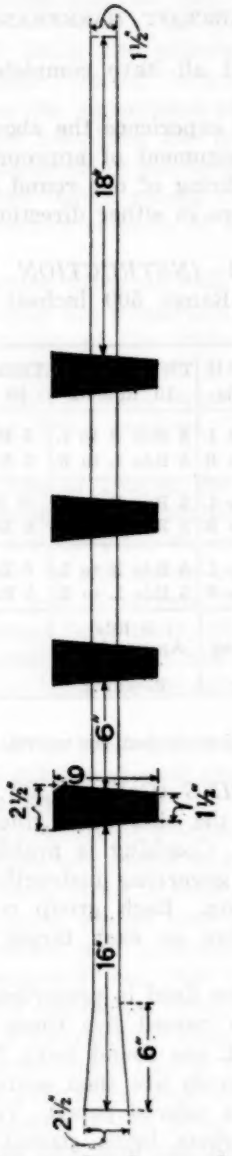

FIGURE 6.—Non-overhead record firing target.

e. Targets should be changed or pasted after each order has fired.

f. Should an individual fire a shot at a target before it is in motion one point should be deducted from his score.

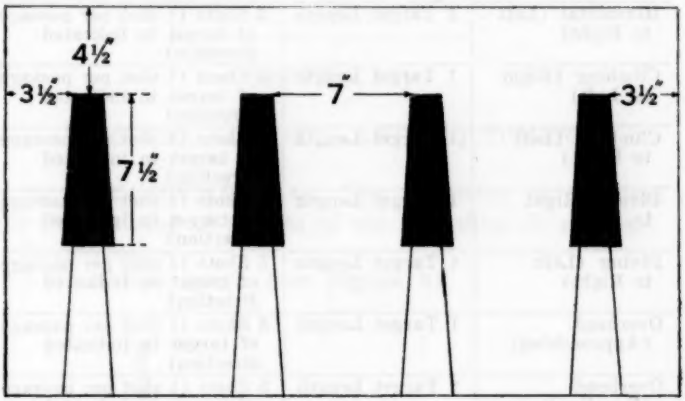

FIGURE 7.—Overhead record firing target.

g. Misfires are refired.

h. A value of one is given to each hit on any part of a silhouette. Antiaircraft rifle marksmanship qualification consists of 30 per cent hits on the horizontal target, 25 per cent on the climbing and diving targets, and 60 per cent on the overhead target.

TABLE II—RECORD FIRING
(Range 500 inches)

TARGETS	LEADS	NUMBER OF SHOTS
Horizontal (Right to Left)	1 Target Length	5 Shots (1 shot per passage of target in indicated direction)
Horizontal (Left to Right)	1 Target Length	5 Shots (1 shot per passage of target in indicated direction)
Climbing (Right to Left)	1 Target Length	5 Shots (1 shot per passage of target in indicated direction)
Climbing (Left to Right)	1 Target Length	5 Shots (1 shot per passage of target in indicated direction)
Diving (Right to Left)	1 Target Length	5 Shots (1 shot per passage of target in indicated direction)
Diving (Left to Right)	1 Target Length	5 Shots (1 shot per passage of target in indicated direction)
Overhead (Approaching)	1 Target Length	5 Shots (1 shot per passage of target in indicated direction)
Overhead (Receding)	1 Target Length	5 Shots (1 shot per passage of target in indicated direction)
		Total shots 40

20. *SQUAD FIRING 0.22 CALIBER.—a. General.*—Squad or group firing is the final phase of antiaircraft marksmanship training with the caliber 0.22.

b. It provides for squad competitions and illustrates the effectiveness of the combined fire of a number of riflemen.

c. Squad firing should not be undertaken until the individual training and instruction has been completed.

d. Procedure.—(1) Silhouettes are assigned to squads instead of individuals.

(2) When each group has completed the squad firing on their respective targets, groups change targets, and the practice is continued until all squads have fired as a unit on all types of targets.

(3) Each man of the front rank, then each man of the

rear rank, fire ten rounds according to the procedure prescribed in paragraph 19*d* above, except that targets are not scored until completion of firing by the entire squad.

e. Scoring.—A value of one is given each hit on the silhouette.

f. Rules governing squad firing.—The rules covering individual record practice govern the squad firing.

SECTION VII

TARGETS, RANGES, AND EQUIPMENT

21. *REQUIREMENT.*—*a.* The following is required for the training of a class of not exceeding 16 squads.

b. Ranges.—

1 Horizontal range (see Figure 8)

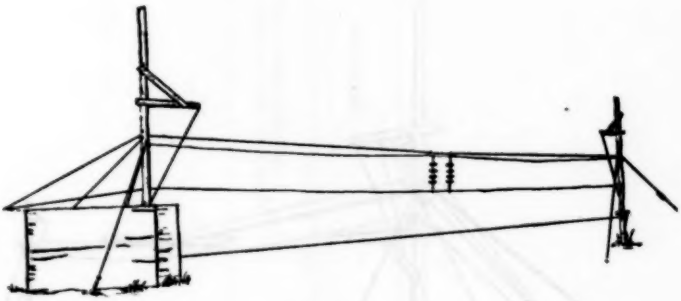

FIGURE 8.—Horizontal range.

1 Double climbing and diving range (see Figure 9)

1 Overhead range (see Figure 10).

Note: For details of range apparatus see Figures 11, 12, 13, 14, 15, and 16.

c. Equipment.—

64 Caliber 0.22 rifles

1 Score card per man (see Figure 17)

4 Aiming and leading targets (see Figures 3*a* and 3*b*).

Note: Each of these targets consist of a piece of

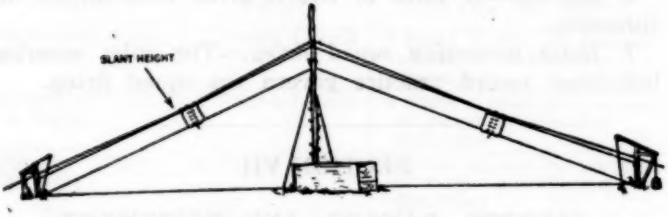

FIGURE 9.—Double climbing and diving range.

beaverboard on which the silhouettes are pasted.

6 Instruction firing targets per range (see Figures 4 and 5).

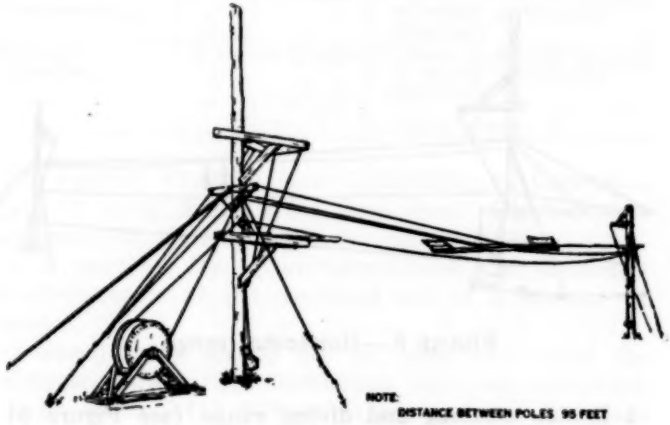

FIGURE 10.—Overhead range.

Note: These targets are the same as the aiming and leading targets except that the spotters are eliminated.

6 Record firing targets per range (see Figures 6 and 7).

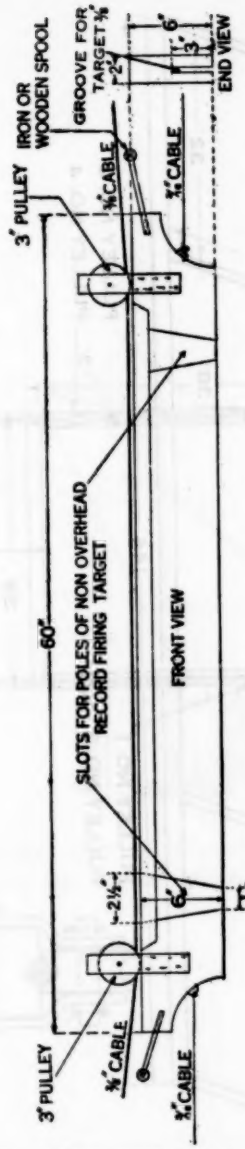

FIGURE 11.—Non-overhead target carrier.

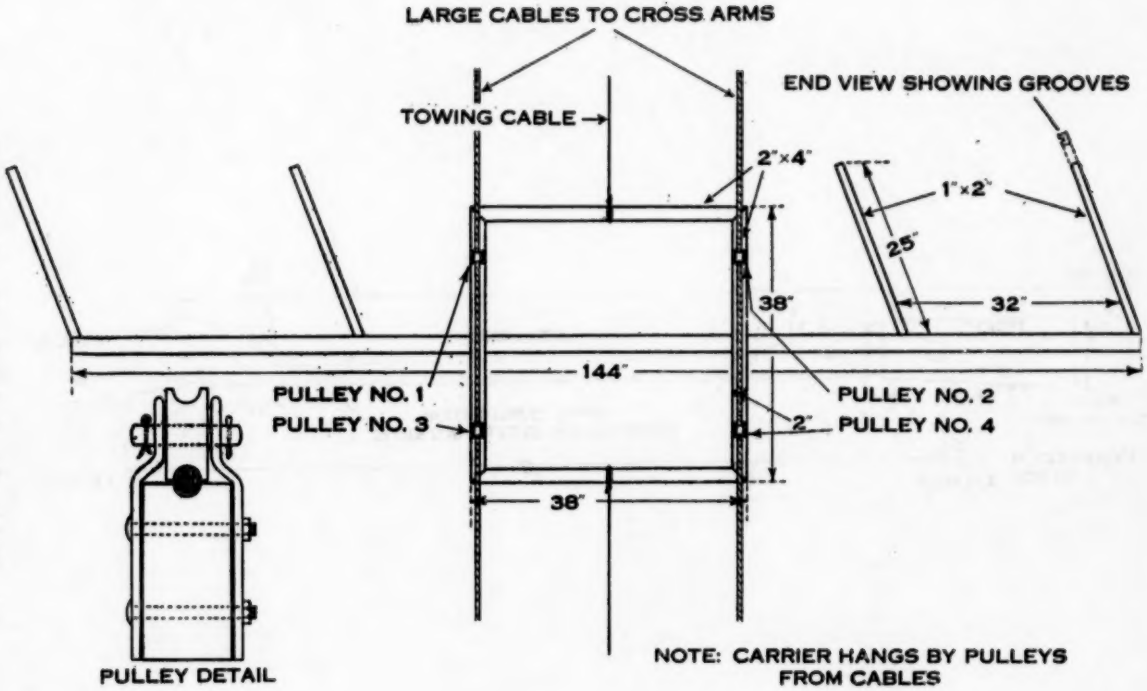

FIGURE 12.—Overhead target carrier.

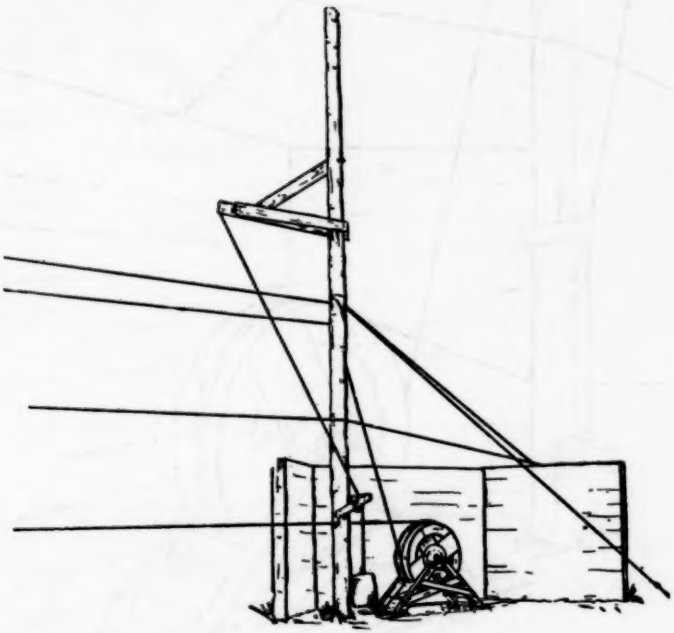

FIGURE 13.—Rear view of non-overhead range butts, showing drum, guide wires, and bumper.

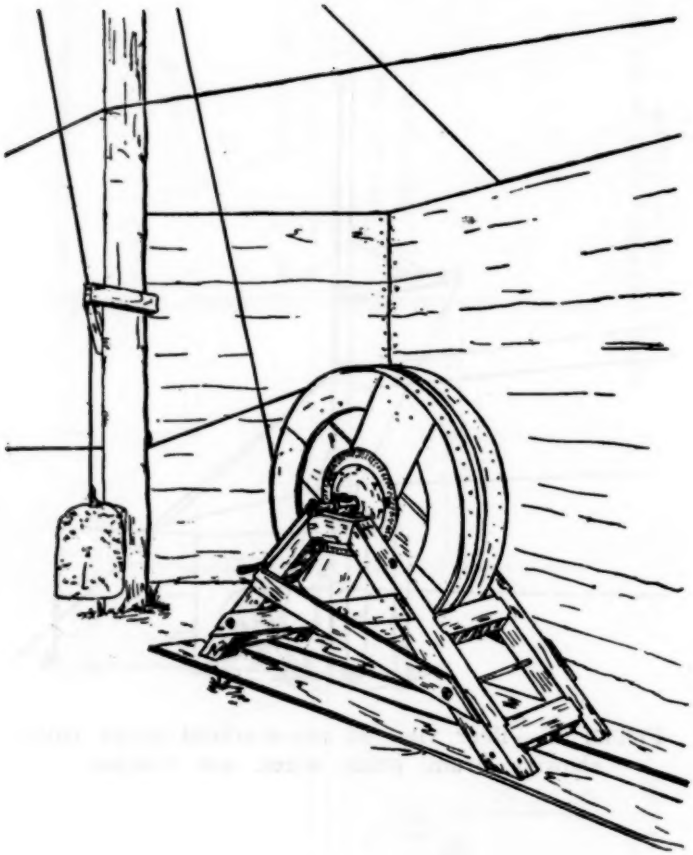

FIGURE 14.—Moving target drum. One complete turn moves target 15 feet.

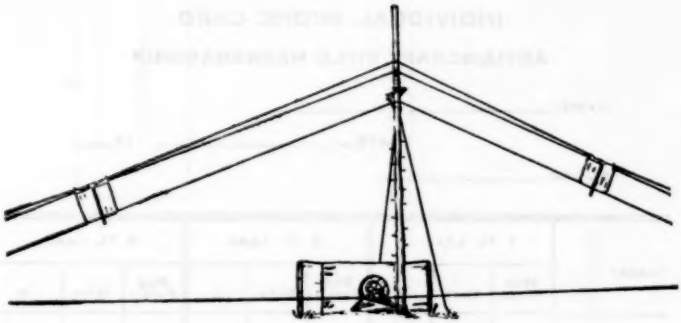

FIGURE 15.—Rear view of climbing and diving target.

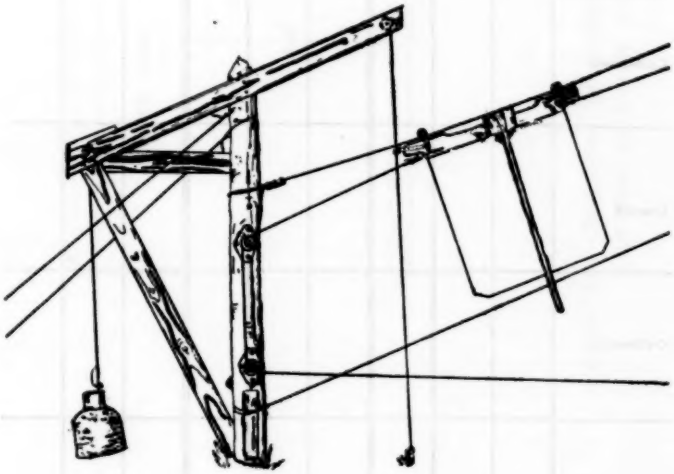

FIGURE 16.—Rear view of climbing and diving target and method of securing target to frame.

INDIVIDUAL SCORE CARD

ANTIAIRCRAFT RIFLE MARKSMANSHIP

NAME: _____

DATE _____ 19____

SQUAD: _____

TARGET	1 TL LEAD			2 TL LEAD			3 TL LEAD		
	RDS FIRED	HITS	%	RDS FIRED	HITS	%	RDS FIRED	HITS	%
HORIZONTAL									
CLIMBING									
DIVING									
OVERHEAD									
TOTALS									

FIGURE 17.—Individual score card.

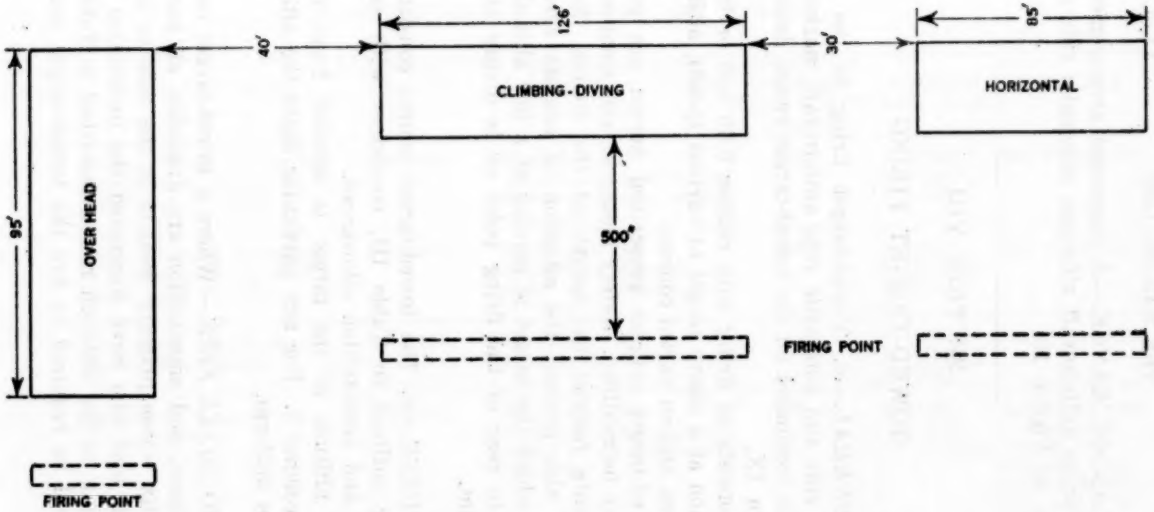

FIGURE 18.—Suggested arrangement of antiaircraft rifle and automatic rifle range.

22. *PLAN OF RANGE.*—A suggested arrangement of targets for an antiaircraft rifle and automatic rifle range is shown in Figure 18.

SECTION VIII

TOWED-TARGET FIRING

23. *GENERAL.*—*a.* Towed-target firing is the final phase of rifle and automatic rifle antiaircraft marksmanship. It is conducted on the towed-target range described in Section IX.

b. It consists of firing with caliber 0.30 ball or tracer ammunition at a sleeve target at various speeds, altitudes and ranges, and on varied courses.

c. Towed-target courses prescribed herein are guides which may be modified. Safety measures and ammunition requirements restrict the length of the course. Safety measures also prevent the adoption of courses such as those on which the target is moving at a low altitude, is receding in rear of the firing point or is diving at the firing point.

24. *COURSE.*—*a.* The towed-target course consists of the firing outlined in Table III, consistent with saftey measures and ammunition allowances.

b. The altitude of the target is selected from those given in column 3. For any particular flight the altitude selected is uniform.

25. *WHO SHALL FIRE.*—Where a towed-target range, towing planes, and ammunition are available, all personnel of units whose primary weapon is the rifle or automatic rifle, and who have completed the instruction and record firing on the 500-inch range, described in Tables I and II, will be required to fire the towed-target course.

TABLE III (See Figures 19, 22, and 23)

TOWED-TARGET COURSE OF FIRING

COURSE	TYPE OF COURSE	ALTITUDE OF TARGET (Feet)	HORIZONTAL* RANGE OF COURSE (Yards)	SPEED OF TOWING PLANE MPH (Approx)	ROUNDS PER MAN	REMARKS
1.	Non-overhead horizontal (parallel to firing line from left to right)	900-1500	Minimum: 200 Maximum: depends on width of danger area of range	100	3 (rifle) 8 (USSA) 6 (AR)	See Figure 19
2.	Non-overhead horizontal (parallel to firing line from right to left)	900-1500	Minimum: 200 Maximum: depends on width of danger area of range	100	3 (rifle) 8 (USSA) 6 (AR)	See Figure 19
3.	Overhead (perpendicular to firing point)	900-1500	Minimum: 200 Maximum: 500	100	3 (rifle) 8 (USSA) 6 (AR)	See Figure 20
4.	Combined Courses 1, 2, and 3	900-1500	Minimum: 200 Maximum: depends on width of danger area of range	100	9 (rifle) 18 (AR) 24 (USSA)	Reload at completion of 3 rounds for rifleman, 6 for automatic rifleman and 8 for USSA rifleman. See Figure 21

* The horizontal distance from the firing point to a point directly under the target.

26. *CONDUCT OF TOWED-TARGET RANGE PRACTICE.—a. Officer in charge of range practice.*—The officer in charge of range practice is detailed by the regimental or unit commander for the purpose of arranging and supervising the details with reference to firing as prescribed in this section and in Section IX. He is responsible for the rigid application of safety precautions. He will make timely requests to the range officer for repairs, supplies, and alteration of installations. He will be assisted by safety officers as prescribed in Section IX.

b. Range officer.—A range offier is appointed well in advance of range practice. His chief duties are:

(1) To make timely estimates for material and labor to place the range in proper condition for firing.

(2) To supervise and direct the repairs and alterations to installations.

(3) Where safety demands, to instruct and supervise range guards.

c. Company commander.—The company commander, assisted by his platoon commanders, supervises his unit during firing and is responsible for the efficiency of its training.

d. Personnel at the firing point.—No more than one platoon with such assistants as are necessary to control and direct the firing, will be at the firing point.

e. Range practice, Courses No. 1 and 2.—(1) The purpose of Courses 1 and 2 is to teach the correct method of delivering fire on an air target whose course is non-overhead and which passes the firer's position at a minimum horizontal range of 200 yards and at an altitude of between 900 and 1500 feet.

(2) The practice is fired in one exercise. In Course No. 1 the sleeve target is towed from left to right. In Course No. 2 the sleeve target is towed from right to left. In each course the sleeve target is fired upon by the entire platoon at the firing point while the target is within the limits of the danger area. Upon taking their places on the firing line, individuals assume the kneeling position.

As the towing plane approaches the left (or right) side of the danger area, the officer in charge of range practice gives the command, 1. *Load.* 2. *Sleeve target approaching from the left (or right).* Each rifleman loads three rounds and locks his piece, each automatic rifleman inserts magazine (loaded with six rounds), but does not pull the bolt

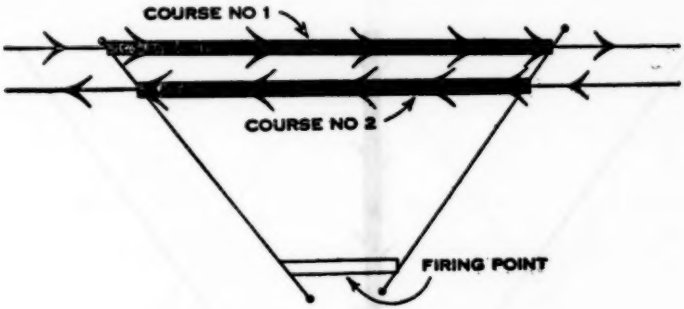

FIGURE 19.—Courses Number 1 and 2. Firing takes place when target is on shaded portion of course.

to the rear. As the towed target approaches the danger area, the officer in charge of the firing commands, ——— *target-length leads,* using the necessary target-length leads. Individual riflemen unlock their pieces, automatic riflemen pull operating handle back, and all take proper aim with designated lead on sleeve target. At the command, 4. *Commence firing,* all fire in the method and with the announced lead as prescribed in Section IX.

f. Range practice Course No. 3.—(1) *Purpose.*—The purpose of Course No. 3 is to teach the correct method of delivering fire on an air target whose course is overhead and which passes the firer's position at an altitude of between 900 and 1500 feet.

(2) *Practice.*—The practice is fired in a manner similar to Course No. 1 and Course No. 2 with the following exception: The target is towed from front to rear and

is fired on when it arrives at a point whose horizontal distance is 700 yards or less in front of the firing line.

g. Range practice Course No. 4.—(1) *Purpose.*—The purpose of Course No. 4 is to teach a method of firing at

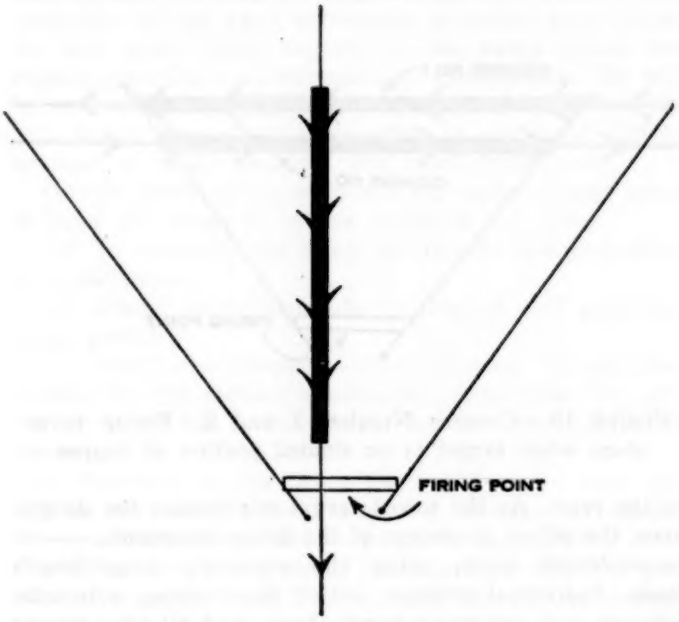

FIGURE 20.—Course Number 3. Firing takes place when target is on shaded portion of course. Fire is opened when towing plane is 100 yards or less from firing point.

an air target towed in a combination of the horizontal and overhead courses.

(2) *Practice.*—The course is fired in a manner similar to Courses 1, 2, and 3. Rifles and automatic rifles are loaded during the change in direction of target and while the plane is out of the danger area, making a change of direction.

SECTION IX

TOWED-TARGET RANGE AND TARGETS

27. *RANGE.*—*a.* In selecting the location of a towed-target range the danger area is the chief consideration.

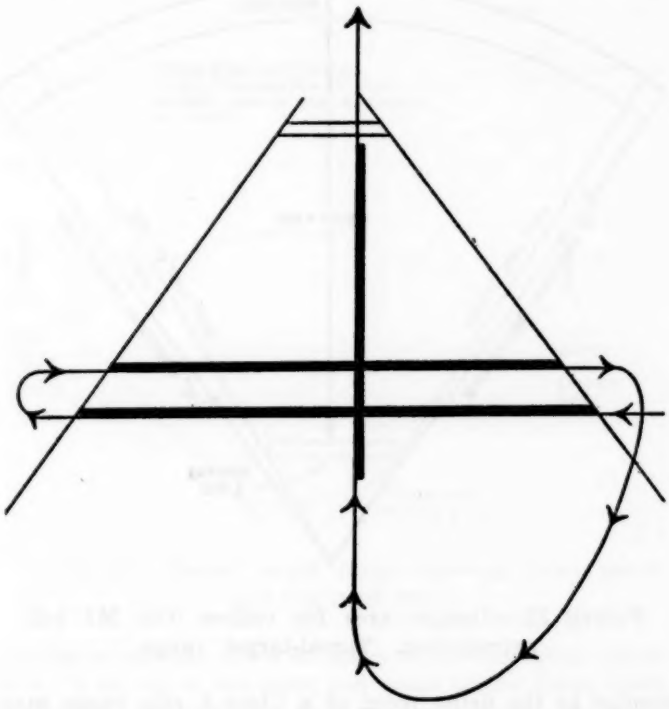

FIGURE 21.—Course Number 4. Heavy line indicates when towed target is fired upon.

The shape, dimensions, and layout for firing with caliber 0.30 M1 ball ammunition are shown in Figure 22. Training Regulations No. 140-5 gives data for figuring danger areas for all types of ammunition.

b. The firing point should accommodate at least 50 men in line with a one and one-half yard interval between men. A level strip of ground, preferably on a hill, 75 yards long and 2 yards wide is suitable. A firing point

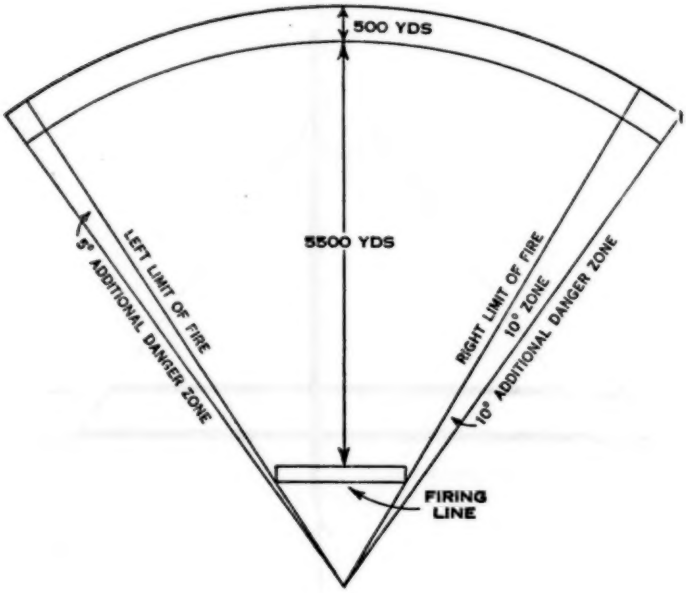

FIGURE 22.—Danger area for caliber 0.30 M1 ball ammunition. Towed-target range.

similar to the firing point of a Class-A rifle range may be built.

c. (1) After the towed-target range has been selected, the firing point, limits of fire, and danger area should be plotted on a map or sketch of the area. (See Figure 22.)

(2) From this map or sketch the range is then laid out on the ground. First, each end of the firing point is

marked by a large stake. The right and left limits of fire are then each marked by a post. Each post is placed at the maximum distance at which it will be plainly visible from the firing point. When these distances have been determined, the posts are located in azimuth by the following method: To locate the post marking the left limit

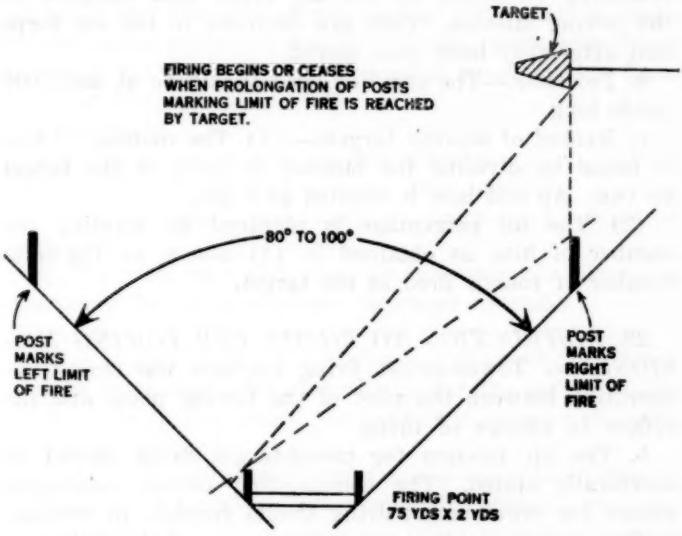
TARGET
FIRING BEGINS OR CEASES WHEN PROLONGATION OF POSTS MARKING LIMIT OF FIRE IS REACHED BY TARGET.
80° TO 100°
POST MARKS LEFT LIMIT OF FIRE
POST MARKS RIGHT LIMIT OF FIRE
FIRING POINT 75 YDS X 2 YDS

FIGURE 23.—Towed target range showing firing point and limits of fire.

of fire, an aiming circle or other angle-measuring instrument is set up at the right end stake of the firing point. It is then oriented and laid on an azimuth which—by reference to the map or sketch—is known to be the farthest to the left that the rifle at the right end of the firing point can safely be fired. The post marking the right limit of fire is similarly located with the instrument set up at the left end stake of the firing point (see Figure 23).

(3) Direction guides for the towing airplane to follow should, within the limits of fire, be distinctly marked on

the ground for each course. White targets or strips of cloth placed flat on the ground about 30 feet apart are suitable.

28. *TOWED TARGETS.—a. Type and source.*—The targets used in towed-target firing are sleeve targets ordinarily furnished by the air corps unit assigned to the towing mission. They are returned to the air corps unit after they have been scored.

b. Tow line.—The tow line used should be at least 600 yards long.

c. Method of scoring targets.—(1) The number of hits is found by dividing the number of holes in the target by two. An odd hole is counted as a hit.

(2) The hit percentage is obtained by dividing the number of hits, as obtained in (1) above, by the total number of rounds fired at the target.

29. *INSTRUCTION TO PILOTS FOR TOWING MISSIONS.—a.* Towed-target firing requires the closest cooperation between the pilot of the towing plane and the officer in charge of firing.

b. The air mission for towed-target firing should be specifically stated. The commanding officer requesting planes for towed-target firing should furnish, in writing, to the air corps unit commander concerned the following information:

(1) The place of firing.

(2) The date and hour of firing.

(3) The number of missions to be flown; altitude, course, speed, and number of runs for each.

(4) The ground signals to be used.

(5) A map of the area with the firing point, danger area, the course of each mission and the location of the grounds for dropping targets and messages, all plotted thereon.

(6) The length of the tow line.

(7) The number of sleeve targets required.

c. Whenever practicable, the officer in charge of the

firing should discuss with the pilot the detailed arrangements mentioned in *b* above. If necessary, this discussion should take place on the towed-target range where the various range features can be pointed out to the pilot.

30. *SIGNALS.—a.* For signalling from the ground to the pilot any method agreed upon by the officer in charge of firing and the pilot of the towing plane may be used. White panels about six feet by six feet, with large black numbers are suitable. The following panel signals have been found to be satisfactory.

1 — Ready

0 — Drop target and repeat mission.

4 — Drop target and execute next mission.

8 — Drop target and return to airdrome—all missions completed.

b. The pilot may also communicate with the officer in charge of firing by dropped messages or radio.

31. *SAFETY PRECAUTIONS.—a.* Towed-target firing will be conducted with due regard for the safety of the pilot of the towing plane, the personnel engaged in firing and all spectators.

b. All firing must be controlled by suitable signals or commands. All signals and commands, particularly *Commence firing* and *Cease firing* are given in such a manner as to be clearly and promptly understood by everyone engaged in firing.

c. The signals and commands for commence firing and cease firing must be given so that no bullets fall outside of the danger area.

d. For all courses in which the towing plane is flown over the firing point, the signal or command for commence firing will not be given until the towing plane has reached a point 100 yards or less, measured horizontally on the ground, from the firing point, so that there is no danger of bullets dropping outside the danger area.

e. Whenever a tow line is cut and the towing plane is on a course which passes near the firing point, all person-

nel in that vicinity should lie flat on the ground until the end of the cable has passed beyond the point where there is danger of anyone being injured by it.

f. No rifle or automatic rifle should be pointed at or ahead of the towing plane. Muzzles should be depressed during loading.

g. At least two safety officers should be designated to assist the officer in charge of firing in carrying out safety precautions.

h. In addition to the safety precautions prescribed herein, the rules, regulations and safety precautions prescribed in Basic Field Manual, Volume III, Part One, Chapter 2 and in TR 140-5 for towed-target firing will be strictly adhered to.

32. *PROCEDURE IN FIRING.*—*a.* The platoon or other firing unit is put in position on the firing point with at least a one and one-half yard interval between men. The officer in charge of firing observes the direction from which the target will approach. Upon approach of the plane he gives the command, *1. Load, sleeve target, approaching from left* (*right*) (*front*). Individuals load and lock as described in paragraph 26*e*(2). As the towed target approaches the danger area, the officer in charge of firing commands, —— *target-length leads,* using the necessary target-length leads to hit the target.

b. When the sleeve target is being towed on a course parallel to the firing point the safety officers should be stationed at each end of the firing point so that each can align on the end stake matching the opposite side of the danger area. (See Figure 23.) The safety officer at the end of the firing point farthest from the towed target observes its approach with relation to his safety line. When the target has completely crossed the line he signals or commands, *Commence firing.* At this command pieces are unlocked, each firer applies the target length as a unit of measure in measuring the announced lead. The firer then directs his aim on that point and by swinging the rifle in the manner specified in Section V, maintains the aim at

the proper lead, at the same time applying a constantly increasing pressure on the trigger until the piece is discharged. Any tendency toward volley firing will result in flinching and a cone of fire in rear of the target. The safety officer at the other end of the firing point observes the flight of the towed target during the firing. When the towed target is about to reach the opposite limit of fire as viewed by him, he commands or signals, *Cease firing.* All signals or commands are relayed by assistants to the officer in charge of firing to insure that all men on the firing point hear or see them.

c. When the target is being towed perpendicular to and over the firing point the officer in charge of firing commands or signals, *Commence firing* and *Cease firing* as in paragraph 31*d.*

SECTION X

ADVICE TO INSTRUCTORS

33. *GENERAL.*—The purpose of towed-target firing is to train men in applying the principles and technique of antiaircraft firing—as taught on the 500-inch range—to a target which approximates, in speed, ranges and direction of flight, those of actual combat.

34. *FIRING UNIT.*—Individual firing at a towed target being impracticable, all firing is done by a unit of such size that its fire can be readily controlled and directed. A small firing unit readily permits this control; but too small a unit wastes range facilities and thus retards training. The platoon is the most convenient unit for such firing. Its size is such that it does not form a bottleneck in training and when placed on the firing point it can be controlled and it does not overextend to the extent that one flank is endangered by fire from the other.

35. *DELIVERING FIRE.*—In the delivery of fire a-

gainst a towed target (or aircraft), it is necessary for the unit leader to estimate the range and probable speed, to designate targets, and distribute fire and enforce fire discipline. Range and speed estimation is important because these factors determine the lead to be used.

36. *ESTIMATION OF RANGE.*—Due to the necessity for rapid delivery of fire after the appearance of the target, estimation by eye is the only practicable method for infantry use. The normal method is by comparison of the apparent size of the target with similar sizes which have become fixed in the mind of the firer through known-distance firing and range estimation. The results to be expected will depend on the amount of known-distance flying which has been observed. If air service equipment is available, valuable training in range estimation can be given by arranging with the air corps to fly measured courses at different altitudes and speeds. This course should include ranges of 100 to 800 yards inclusive and elevations of 100 to 1,000 feet, with speeds from 100 to maximum. If space will not permit actual firing, valuable practice can be given the riflemen by letting them simulate firing at a sleeve towed by the plane flying the measured course for the range estimation work of the unit leaders.

37. *TARGET DESIGNATION.*—*a.* Due to the visibility and limited number of aerial targets, the same importance does not attach to target designation as in firing against ground targets. Attacking aviation will usually fly in V-shaped formations of three planes each. Should all the fire of a rifle unit be directed at one plane the normal dispersion will result in effective interdiction of the remaining planes of the formation.

b. The method that is usually used in designating targets is to assign each unit in the column a target and an alternate target before the area of possible hostile attack is reached. This assignment is not changed except under unusual circumstances. One method is to designate the center or leading target to the first two squads of the

platoon, the target on the right to the third and fourth squads, the target on the left to the last two squads; in case less than three planes attack, the units not having a target should fire on the leading target.

c. The normal assignment of a target extends from its initial appearance until it passes beyond range. The unit leader seeing a succession of groups of hostile planes will cause his unit to cease firing at one group in time to bring fire on the following groups as they approach within effective range.

38. *FIRE DISTRIBUTION.*—Fire distribution differs from fire distribution on ground targets in that a unit firing at aerial targets has but one such target. The fire of this unit, however, must be so distributed in the path of the target that it will be under effective fire whether the speed varies from a minimum of probably 80 miles per hour to a maximum of 250 miles per hour.

39. *MINIMUM RANGE METHOD.*—*a.* In non-overhead towed-target fire the minimum range method has been found to be the most effective. (See Figure 24.) This system is based on the fact that since the target is constantly moving, the range, as well as the lead, is constantly changing. Due to the rapidly-changing angle of the target, a lead computed on the basis of the minimum range is sufficiently accurate to insure a large percentage of hits. It is simpler than changing the lead for each shot fired and results in an effective cone.

b. A lead table is computed to the nearest target length on the basis of a 30-foot target for the known speed of any hostile aircraft and committed to memory by all concerned. This table should include leads, based on the known speeds, for ranges from 100 to 1,000 yards. In practice, as soon as the target appears in view the minimum range is estimated from the direction of flight, and the lead for that range is given in the fire order or signal. For approaching and receding targets at an altitude of less than 1,000 feet, the lead is approximately one-fourth of

that required for a target passing parallel to the front.

c. Since all lead tables will be computed with approximate data, the minimum range on which the lead is based is an estimate hastily made. Fire opened at ranges requiring a lead greater than the lead necessary to hit the

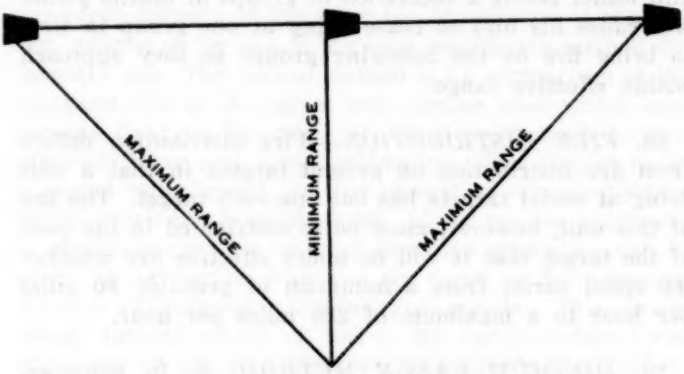

FIGURE 24.—Minimum range is the nearest slant range that target will be to the firer.

target at the minimum range, is subject to several unavoidable inaccuracies. But the combination of these minor errors, plus the errors of the individuals of the fire unit in estimating leads and in firing, will compensate for one another and will tend to produce fairly accurate results. A lead table is, therefore, only a guide.

40. *LEAD TABLES.*—The following table of leads is computed on the basis of a 30-foot sleeve target moving at a speed of 100 miles per hour, flight of target horizonal non-overhead.

Minimum Range	*Lead in Target Lengths*
100	1
200	2
300	2
400	3
500	4
600	5
700	5
800	6

Such a table may be computed for the known speed of any hostile aircraft. In using lead tables the minimum range at which the target is expected to pass the firer is used.

CHAPTER 2

A Man Stands Alone

(AN INFANTRY SCHOOL HISTORICAL STUDY)

" * * battle are won and lost by remnants. remnants of units, remnants of material, remnants of morale, remnants of intellectual effort, * * * victory goes to the side whose remnants can be made to hold out for one gasp longer than the remnants of the other side."* Major General Hanson Ely.

It was the first week of August 1920 and the Polish Armies, crushed by the relentless advance of the Russians, were being pushed back from the line of the Bug, toward the Vistula.

In the north the brilliant young Soviet general, Toukhatchevsky, had massed his troops for the final maneuver to end the war. In the south Budienny's cavalry army was ready to resume its steady western sweep. In Poland all was chaos. In the calculating eyes of the foreign military observers Poland was doomed. These wise professionals believed that Warsaw, itself, would fall within ten days. With Warsaw went Poland.

The situation was desperate. Before the vigor of the Bolshevik attack the Polish troops had been retreating rapidly. Their tragic retreat had covered a distance of about 300 miles (see Figure 25). The very structure of the Polish Army was crumbling. The capitol was flooded by unmolested deserters, confidence was lacking in the

Army, and a dull despair had settled upon the people. The nation was disintegrating.

Yet the Poles themselves were largely to blame for their dire predicament. Initially, they had made a splendid advance. Their armies had almost reached the limits of the Old Poland of the Middle Ages, but in doing so they had overreached themselves. They had led themselves astray by their concentration on the mistakes of Kuropatkin in the Russo-Japanese War. He had lost battles because he failed to use intact reserves. Determined not to do likewise, the Poles had substituted a cordon defense without adequate reserves. It was equally bad tactics. The alert French warned them of the danger and had recommended holding out reserves and echelonment in depth, but none would listen. Then, when the Bolshevik armies struck hard, the cordon broke at the first shock, and disaster overtook the victory-flushed Poles. Thereafter, because of the relentless Bolshevik pressure, no time was available to form reserves or regroup.

For the moment, however, the broad, protective barrier of the Vistula River quietly protected Warsaw from invasion. The panic and confusion in the capitol, reflected in the mirror of the river, caused no disturbance in the water. It was as unaffected by the hysteria of the people as the secluded study in the Belvedere, headquarters of General Pilsudski, commander of the Polish armies.

There, a lone, tired man with sagging shoulders was deliberately pacing the floor. Deep set lines held his mouth firm under a drooping mustache. His gray eyes revealed the strain of the search for a solution to the problem that his mind alone must solve. There was an intensiveness of purpose coupled with an air of desperation about his controlled movements. At intervals he stopped in front of the maps hanging on the wall of the study, then resumed his pacing. These maps, clear in the harsh bright light, showed the ominous dispositions of the Russian armies.

Was it the pressure of these dismal pictures surging

up in endless repetition through his mind that caused him to stop so frequently in front of the maps? Would this insistent suggestiveness of disaster, this constant

FIGURE 25.—Operations July 1st to August 5th.

contemplation of Poland perishing, so benumb his intellect and deaden his will that it would effectively suffocate at birth any creative idea which might point to a way out? Such things have happened to even the greatest soldiers. Who can explain the lethargy of Napoleon before the fatal battle of Leipzig?

Joseph Pilsudski was not a professional soldier. Commander in chief at the age of 53, he lacked a formal military education, but he had—his intimates have told us—a thorough knowledge of Napoleonic maneuver, gained by a methodical study begun at the age of 41. As head of the state and commander in chief of the Polish Armies, the fate of Poland, and perhaps that of western Europe, rested with him.

Could Pilsudski find the remedy he sought? Could he replace the despair of a beaten people with hope and infuse in them the will to win? Could he gather up the broken fragments of his armies, the scattered materiel, the remnants of crushed morale, the disorganized units, and like a military Cellini recast them in the mold of victory?

England and France, in response to a call for assistance during the month of June, had replied by sending to Warsaw an Anglo-French Mission composed of diplomatic and military elements. In addition they had supplied certain essential munitions. Pilsudski, however, ironically said that he attached far more importance to supplies obtained through his single precarious line of communications, Danzig to Warsaw, than to any assistance in the form of advice.

On July 27th this Anglo-French Mission and the Polish defense committee first met at Warsaw. Between then and the night of August 5th, Pilsudski had been in many conferences with the mission—conferences, all characterized by a flood of words. He, himself, had listened in silence, an inscrutable figure. Although it had been agreed that the views of General Weygand of the French Mission would receive the fullest consideration, Pilsudski was antagonistic.

On August 4th, General Weygand estimated that Warsaw was in danger of being outflanked from the north and recommended that a powerful army be created for that flank. He advised establishing a solid front far enough in the interior of the country so as to be able to

reconstitute reserves, and with these reserves launch a counter-offensive from both flanks. This was the advice of a competent professional soldier with four years of a major war behind him. It seemed good, sound counsel.

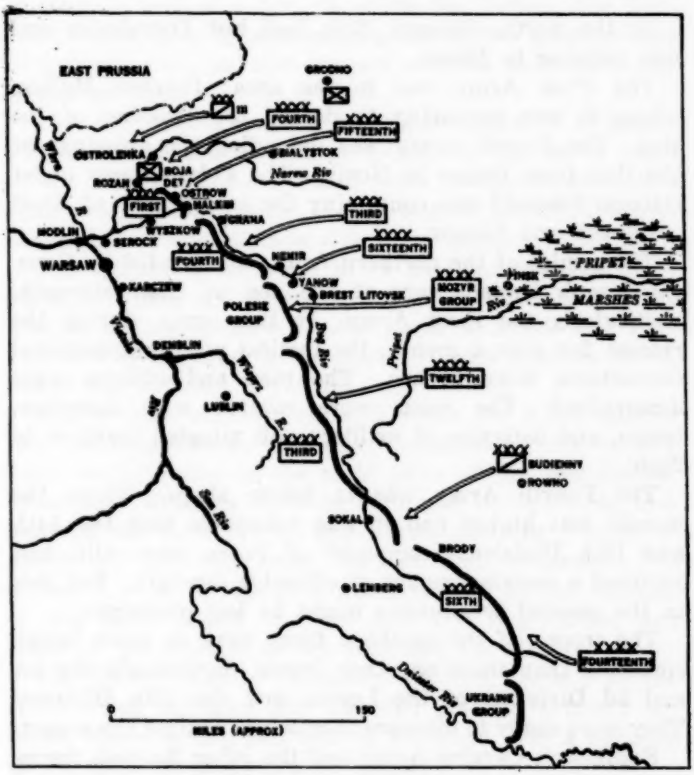

FIGURE 26.—Situation August 5th.

But Pilsudski was not in agreement—why no one knows—and, characteristically, on the night of August 5th-6th he shut himself up in his study so as to be better able to think out a solution of his own.

The maps hanging on the wall of the study clearly depicted the situation as Pilsudski knew it (see Figure 26).

THE POLISH SITUATION

In the north, General Roja had lost Ostrolenka and was retiring to Rozan.

The First Army was in the area: Ostrow—Malkin, where it was preparing to defend the crossing of the Bug. The Fourth Army was defending the crossings of the Bug from Grana to Nemir. The Polesie force under General Sikorski was containing the enemy west of Brest—Litovsk and Yanow.

The armies of the northern front, commanded by General Joseph Haller, were at the end of their strength, particularly the First Army. In this army, during the retreat for over a month, the tactical and organizational connections were broken. The men and officers were demoralized. The roads were covered with deserters, trains, and batteries of artillery—all mingled together in flight.

The Fourth Army was in better shape. There the morale was higher and it was noticeable that the 14th and 15th Divisions—composed of Posen men—still had retained a certain amount of offensive strength. But this in the general break-down might be lost overnight.

The troops of the southern front were in much better condition than those on other fronts, particularly the 1st and 3d Divisions of the Legion and the 18th Division. They were ready to measure themselves against the enemy.

Budienny's Cavalry Army and the other Russian forces in the south had been temporarily checked along the Bug. There was a lull in the fighting there. Now, if ever, was the time to shake the Polish armies free from this driving Russian advance and to plan some scheme of maneuver—even a desperate one.

But a scheme of maneuver depends largely on terrain.

What was the terrain over which the armies were operating?

If we turn our attention to the map (Figure 26) we shall see near Modlin the confluence of the Bug-Narew with the Vistula. This terrain feature is important, for it forms a sort of a fan, of which the Vistula, the Bug-Narew, and their tributaries, are the sticks. These rivers, in general, have parallel courses and are barriers to the Soviet advance.

The Bug throughout its course averaged a width of 150 feet and a depth of about 5 feet. In this sector north of the Pripet Marshes, it had some twenty fords of less than three feet in depth. It was easy to bridge, and presented no serious obstacle either for cavalry or artillery.

The Vistula, from Demblin to Modlin, averaged 1,000 yards in width and 6 feet in depth. West of Modlin the Vistula narrowed down to 400 yards at Plock and Wloclawek (off the map to the west). There were no fords, and it was difficult to bridge.

Modlin is an old town situated where the Wkra empties into the Bug-Narew. The city dominates all the vicinity from its lofty site on the right bank of the Bug-Narew. Here were a series of forts arranged in two lines that guarded the fork of the Bug-Narew and the Vistula against an approach from the east and northeast. The defensive value of this area was increased by the marshes of the Wkra where it flows into the Bug-Narew, and those at the junction of the Bug and the Narew.

The bridge head at Warsaw, also, on account of the surrounding marshes and the well planned artillery defense, was a strong position. It stretched over a distance of 30 miles, from Serock to Karczew.

At Demblin there was an entrenched camp, built originally by the Russians when Poland was part of the Empire. It protected the approaches to the river Wieprz from the south.

If we now turn our attention to the military situation, and at the same time keep in mind the nature of the ter-

rain, the following plans will present themselves: (See Figure 26.)

(1) To retire behind the Vistula - San Rivers and defend on that line.

(2) To defend in the present position.

(3) To hold defensively along the present line while concentrating an offensive mass to (a) attack the right of the Bolshevik forces from the area north of Modlin, or (b) penetrate between the northern and southern Bolshevik forces which were connected by the Mozyr Group only, and attack in a northeasterly direction; or

(4) To withdraw to the line of the Vistula while concentrating an offensive mass to (a) attack the right of the Bolshevik forces from the area north of Modlin, or (b) penetrate between the northern and southern Bolshevik forces which were connected by the Mozyr Group only, and attack in a northeasterly direction. This withdrawal would shorten the line, make more troops available for offensive action, and gain time for massing these troops.

Which one of these plans would you adopt? Remember that in making this plan you become responsible for the fate not only of the army and Poland but perhaps all of western Europe. The Bolsheviks have boasted that they would march to the conquest of Europe across the corpse of Poland.

Pilsudski in his study faced squarely this situation.

All these and other things had been afloat in his mind during the night. Weary and perplexed as dawn approached, he turned to the window for a breath of the cool morning air. The first rays of the morning sun glinting on the Vistula lit up his haggard face. Suddenly those vague ideas, which had been floating in solution in his mind, crystallized themselves into a definite shape. He had his plan! Perhaps it happened otherwise, but this at least is clear: that morning Joseph Pilsudski came from his study with a definite plan. His, and no

one else's. *He would withdraw to the line of the Vistula and accept a general battle at Warsaw.*

Whether Pilsudski followed a formal outline, such as "The Estimate of the Situation", in his consideration of the merits of various plans is doubtful. But there is no doubt that he was keenly sensitive to the despair of the people, the discouragement of the army, the extreme difficulty of the military and political situation, together with the necessity for a quickly won victory. And we may infer that, at the time, he felt sure the Russians would follow only one line of action. This appears plain when we read the first paragraph of the regrouping order:

"The rapid progress of the enemy into the interior of the country and their violent efforts to cross the Bug and *march upon Warsaw*, lead the commander in chief to tranfer the northeast front to the line of the Vistula and to accept a general battle at Warsaw." The words "march upon Warsaw" give us Pilsudski's conception of the situation.

Thus we are not surprised when this order also discloses: that in the south he had decided to protect with the minimum forces Lemberg and the Polish oil fields near it. In the north he took steps to prevent being outflanked along the German frontier; in the center to wear the enemy out with stubborn and prolonged resistance at the strong Warsaw bridge head; and, meanwhile, to assemble secretly an army of maneuver on the lower Wieprz for the purpose of attacking in flank and rear the forces that would assault Warsaw (see Figures 27 and 28). No temporary half-measures can be seen in this. Joseph Pilsudski intended to save Poland or go hurtling into oblivion with his people. And the latter is what will happen if Budienny strikes out to the northwest.

ANALYSIS OF PILSUDSKI'S PLAN

If Warsaw was attacked from the east or northeast, the Narew, the Bug, and the Vistula, with all their tributaries, formed a series of barriers. Consequently Pil-

sudski based his order of the 6th on the assumption that the Russian principal attack on Warsaw would be developed south of the Bug. (See Figure 28.) He believed firmly that the Russian Armies in marching north of the

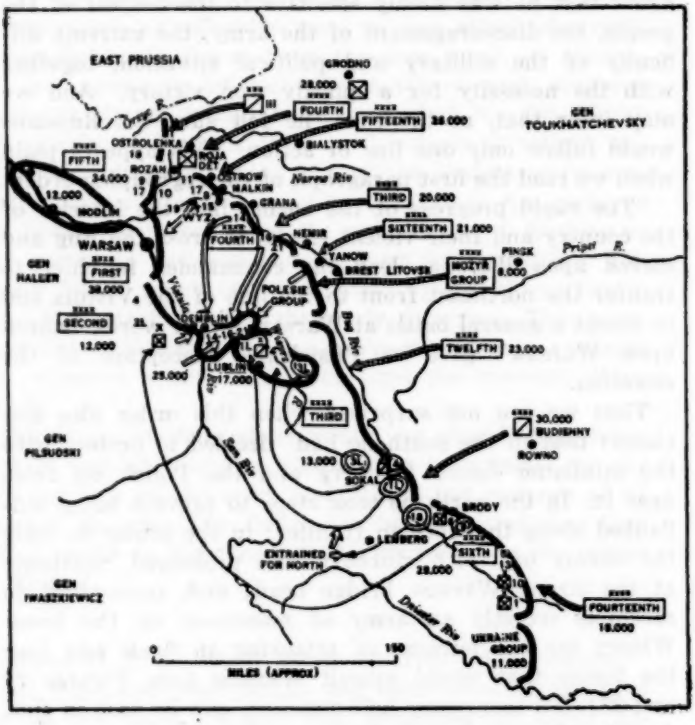

FIGURE 27.—Details of Polish regroupment plan of August 6th.

Bialystok-Warsaw route would pass to the south of the Bug at Malkin or at Wyszkow. Therefore, he considered only two directions for the Russian main advance—that of Bialystok-Warsaw and that of Brest-Litovsk-Warsaw.

Both of these were aimed directly at Warsaw. An attack north of the Bug-Narew, in an endeavor to outflank the Polish left wing from the north along the German fron-

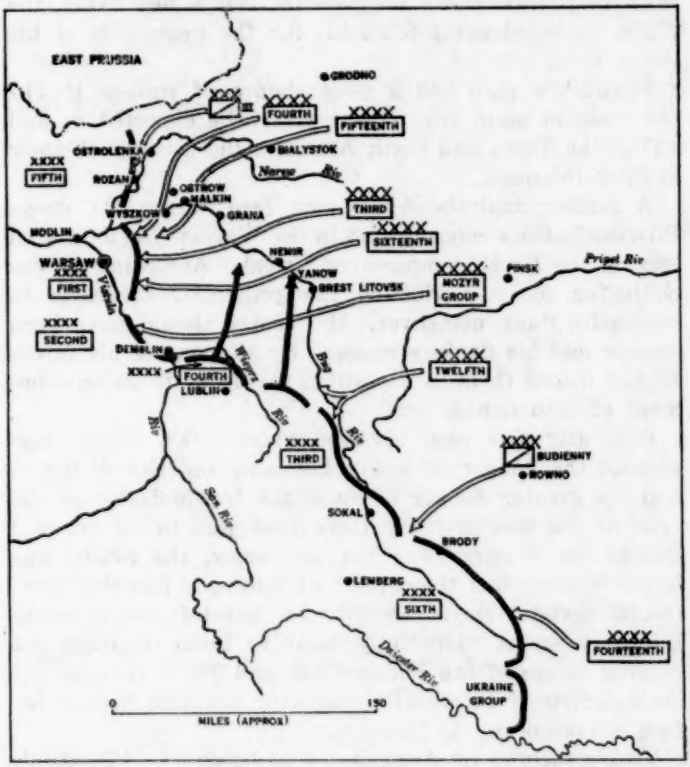

FIGURE 28.—Details of Polish plan of August 6th for a counteroffensive.

tier, was not seriously considered. It was a matter of conjecture only. Pilsudski had overlooked the enemy's capabilities in this direction and had allowed the terrain

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to influence his judgment to the extent that he disregarded this as a likely Russian main effort. He was convinced that the majority of the Russian forces were to be used in a concentric attack on Warsaw. However, he did take the precautionary measure to form a new army, the Fifth, under General Sikorski, for the protection of his north flank.

Pilsudski's plan had a good chance of success if (1) the Russian main effort came where he expected it, and (2) if the Third and Sixth Armies could accomplish their holding missions.

A further analysis of this plan (see Figure 28) shows Pilsudski's mass concentrated in the Warsaw-Demblin area leaving the flanks comparatively weak. According to von Schlieffen, he had violated the principles favorable to successful flank maneuver. His center should have been weaker and his flanks stronger. By so massing his forces he had placed them in a position favorable to an envelopment of both flanks.

Obviously this plan involved great risks. There was present the danger of losing Lemberg and the oil fields; and the greater danger of an attack by Budienny on the rear of the maneuvering force that was to be grouped behind the Wieprz. For but one army, the Sixth, was left to hold against the cavalry of Budienny and the Fourteenth Soviet Army. Should the heretofore successful Budienny strike sufficiently hard to break through the holding forces of the Polish Sixth and Third Armies, the main spring of Pilsudski's maneuver could be broken before it ever began to function.

Two principles of strategy are illustrated in Pilsudski's plan: The strategic flanking position he took up and the fact that to do so he accepted a great risk. But then great risks must be taken to secure great victories. The Command and General Staff School has this to say about these principles:

"All forms of strategic maneuver must have as their ultimate object a decisive battle, offensive or defensive.

It is the object of all strategic defensive maneuvers to enter this decisive struggle under the most favorable conditions. Strategic flanking positions are defensive maneuvers which may place the retreating army in a favorable position to give battle."

* * * * * * *

"The history of warfare shows that all great victories are generally dependent on correspondingly great risks being taken to secure them.'"

No one realized better than Pilsudski the danger of this defensive-offensive combination he had made. Convinced that a concentric advance was to be made on Warsaw, he had not dared to weaken the defensive forces there. Here was the heart of the nation. It must be protected. Consequently, his mass of maneuver, which was to strike the advancing Russians in flank, consisted of only five divisions. From an academic standpoint we have a military absurdity. Fifteen divisions had been given defensive missions, and only five divisions had been given offensive missions. According to all theory, the maneuvering mass should have been much greater. Pilsudski saw this clearly and actually called it an absurdity. But the situation permitted no other solution. This often happens in war, if not in text books.

The exigencies of the situation caused Pilsudski to adopt a strategy which if it worked would place his name among the immortals. It was a situation such as this that forced the brilliant Lee to attack and defeat Hooker at Chancellorsville. No better insight can be obtained into Pilsudski's character than from the following paragraph taken from his own narrative:

"I decided in the first place, not to ask any of my subordinates to assume the responsibility of a scheme of such impractical character, seeing that, as commander in chief, I chose this absurdity as the starting-point of my operations. It seemed only right that I should assume the responsibility for the carrying out of the most absurd part of the plan, and, as a matter of principle, I decided

that the troops for the counterattack should be commanded by me in person. Moreover, this thought pleased me in the sense that during the time of execution of this operation, I should not be exposed to the suggestions of cowards and the sophisms of the incompetent."

Here is a clear-cut example of unadulterated moral courage. Not content with making this plan without aid of consultation, he further insured that his will would be done by deciding to command the maneuvering mass himself. The tremendous vigor of this man's willpower is shown in the words that he used at the time: "I will get on the neck of the 14th Division and ride it to victory."

THE RUSSIAN SITUATION

Simultaneously with Pilsudski's decision to accept a general battle at Warsaw, the Russian High Command were planning to complete their almost finished job. Kamieniev, in command of all Russian forces, directed the twenty-seven year old General Toukhatchevsky, commander of the northern forces, to take Warsaw by August the 12th. This tall, black-haired, fiercely ambitious Bolshevik, is said to have lacked a sound technical training. Yet this is hard to believe when we read his analysis of the situation:

"In seeking the proper direction of attack for the principal effort it was necessary to take into account not only the tactical aspects of the battle but also to think to block the principal and vital lines of communication of the enemy.

"To direct the attack on the center, in the very direction of Warsaw was a task beyond our strength. (See Figure 29.) There remained only the task of seeking the annihilation of one of the wings. By attacking the left wing we would threaten the enemy's principal line of communication with Dantzig.

"Another advantage was in order to carry out this maneuver we would not have to be regrouped. This

enabled us to gain time. Furthermore, we did not have to change our line of communications which ran from Lida toward Warsaw. We did not have sufficient strength to attack both flanks."

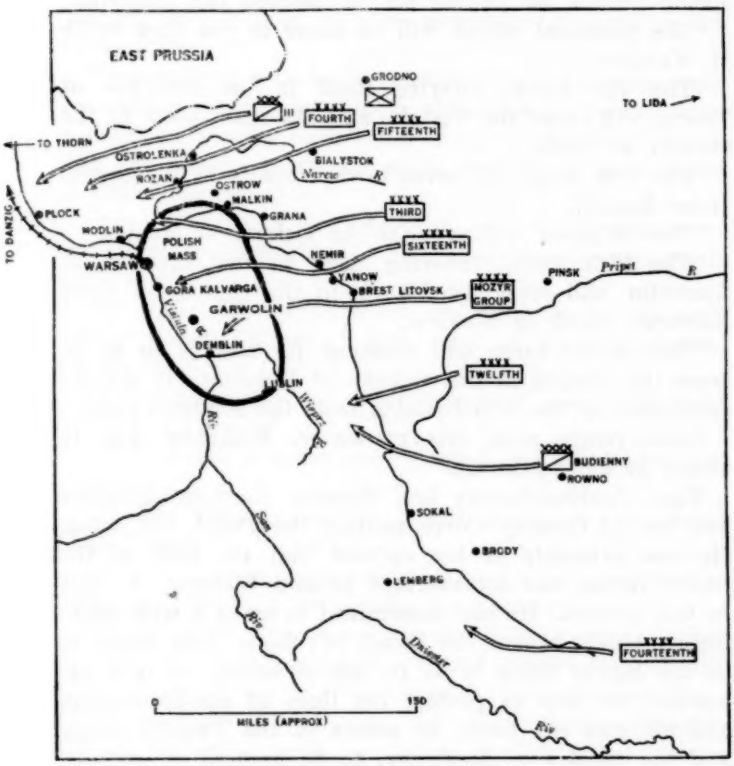

FIGURE 29.—Soviet plan August 8th.

If the ghost of von Schlieffen, that prophet of the battle of annihilation, had been roaming the scenes of past German triumphs in a search for another disciple to add to his cult he could have stopped with Toukhatche-

vsky. For the young Russian saw the great possibilities in a wide flanking maneuver and leaped to clutch his opportunity lest it escape.

Thus Toukhatchevsky, unknowingly, heeded the dying whisper of the great German strategist, "Make the right strong", when on August 8th he ordered the following:

"The principal attack will be made in the area north of Warsaw.

"The 4th Army, covering itself in the direction of Thorn, will cross the Vistula with its main body in the vicinity of Plock.

"The 15th Army will cross in the vicinity of Wyszegrod [near Rozan].

"The 3d Army will cross in the vicinity of Modlin.

"The 16th Army, covering itself in the direction of Garwolin, will cross the Vistula in the vicinity of Gora Kalvarga, south of Warsaw.

"The Mozyr force will continue its attacks so as to cross the Vistula in the vicinity of Demblin. It will be reinforced by the 58th Division from the southern front."

Concurrently with this maneuver, Budienny was to attack to the northwest.

Thus Toukhatchevsky had directed fourteen divisions and the 3d Cavalry Corps against the Polish left wing. He was evidently of the opinion that the bulk of the Polish forces was concentrated around Warsaw. In this he was correct. He had determined to make a wide turning movement around the Polish left flank. This seems to be the logical thing to do in this situation. It only remained for him to protect his lines of communication and his own left flank, by means of the Twelfth Army and the cavalry of Budienny, to be assured of success. He had massed his forces at a decisive point. There he had a numerical superiority. We know Pilsudski did not expect this maneuver and was not prepared to mass in front of it. This gave the added advantage of surprise. There is only one drawback to such a plan, and that is the danger of dispersion and loss of control in making

the wide envelopment. The situation was strikingly similar to that of the Germans and French on the Marne in 1914, and to that of the Germans and Russians at Tannenberg.

We again refer to the teachings of the Command and General Staff School, for the principles of strategy involved here.

"In executing a wide envelopment the enveloping force normally gives up partially or altogether its line of communication in order to threaten those of the enemy. Therefore, the decisive battle can result only in the total defeat of one of the two sides."

"The selection of the objective will be influenced by two main considerations." To paraphrase Leavenworth, these are:

The first: The position of the bulk of the enemy's armed forces [Warsaw] and lines of communications. [to Dantzig].

The second: (1) The great industrial and commercial centers. [Warsaw]

(2) The seat of government control and administration. [Warsaw]

(3) The nation's sources of raw materials. [Railroad from Danzig to Warsaw].

(4) The lines of communication and supply within the nation. [Railroad from Danzig to Warsaw].

This scholarly decision of Toukhatchevsky, which seems so obvious, to-day, apparently had never entered the mind of the Polish High Command. Only General Weygand considered it as a possibility and even he, evidently, did not foresee so wide a swing to the north, for he was convinced on August 8th that the Polish left wing should attack from the north to the southeast. This in order to strike the Russian Fourth Army in flank, and thus stop the concentration on Warsaw. Pilsudski, for the first time, was in agreement with Weygand. He, therefore, changed the mission of the Fifth Army in the north from a primarily defensive one—of preventing an outflanking

movement from the north and protecting the lines of communication—to an offensive one. Combined with what was already planned, this should defeat Toukhat-

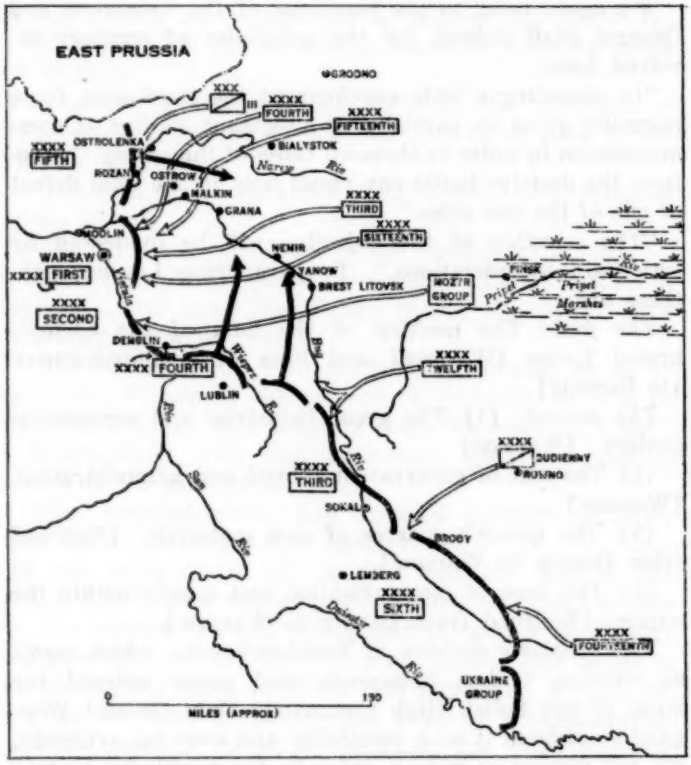

FIGURE 30.—Polish plan of August 8th and Polish conception of Soviet advance.

chevsky, provided he obliged by marching on Warsaw. (Figure 30.)

The stage is now set for the struggle. The decisions of the two commanders have started the armies in motion.

It is evident that a decisive battle will soon be fought. Will the wide envelopment defeat the strategical flanking position? It requires no great stretch of the imagination to visualize the brilliant Corsican and the intellectual von Schlieffen seated in their club across the River Styx playing out this maneuver. Will Pilsudski, the student of Napoleon, conquer, or will von Schliffen at last see his plan work on a giant scale?

SITUATION, AUGUST 6TH TO AUGUST 13TH

That part of the Polish plan which included the forming of a mass of maneuver behind the River Wieprz proceeded according to schedule. However, General Sikorski, who had been personally picked by Pilsudski to command the Polish Fifth Army in the north, found that a false idea had been entertained by his chief. On arriving in the area of intended operations of the Fifth Army on August 10th, he realized for the first time the seriousness of the situation. The Bolshevik flood had broken through the gap between Modlin and East Prussia and had rolled to the west with such rapidity that the Fifth Army was unable to fulfill its mission. Actually the Fifth Army was busy reorganizing and at the same time trying to stop this advance. It had never been possible for this army to attack as had been planned. It was in a precarious situation. (See Figure 31.)

On August 12th Pilsudski left Warsaw and established his headquarters beside those of the Fourth Army. He was now prepared to lean forward on the neck of that 14th Division, which he had said he would ride to victory. He anxiously awaited developments. These came quickly. For, on August 13th an intercepted radio message gave him the information that the Russian Sixteenth Army was about to attack Warsaw. This fitted in exactly with his pre-conceived idea of the Russian scheme of maneuver. He was now completely convinced that his judgment was correct, and as a result he ordered General Haller, com-

mander of the armies of the northeast front to have the Fifth Army attack the Russians in flank as previously planned. It seems incredible that the Polish High Com-

FIGURE 31.—Actual situation August 8th.

mand at that time was unaware of the Russian dispositions in the north, but such was the case. When Sikorski received this order he remonstrated. The reasons he gave, of course, exposed the Bolshevik threat (Figure 31). Coming from so good and trusted a soldier as Sikorski,

it was cause for real concern. Moreover, it was bewildering information, so much so that Pilsudski later likened the situation to an unsolvable puzzle. Curtained by this fog of war Pilsudski also had to listen to the insistent cry of Warsaw that he do something—anything—for them at once.

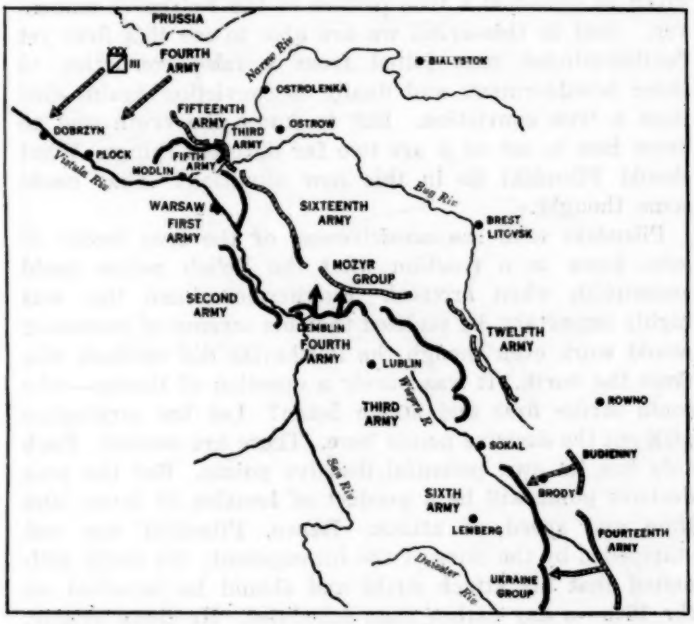

FIGURE 32.—General Polish situation August 12th.

Action of some kind was imperative. Would Pilsudski run pell-mell to the assistance of the Warsaw defenders, or to the north? Would he thus try to find relief by quieting the voices dinning in his ears, or would he, pendulum like, vacillate between his plan and some hastily contrived expedient until it was too late? Unquestionably this unlooked for and decisive move in the north had

to be stopped. But, how? The 17th of August was the time set for the striking force to come from behind the river Wieprz and launch its attack (see Figure 32). What changes in his plan could Pilsudski make to meet this unexpected, disastrous turn of events in the north?

There was one crumb of comfort in all this, for the disquieting news from Sikorski and Warsaw had at last given to Pilsudski a true picture of the Bolshevik maneuver. And in this crisis we are able to see this firm yet flexible-minded man jolted from a false conviction to sheer bewilderment, and finally to conviction again—this time a true conviction. But to know the truth and to know how to act on it are two far different things. What should Pilsudski do in this new situation? That needs some thought.

Pilsudski with the sensitiveness of the true leader of men, knew to a fraction what the Polish people could accomplish when aroused. Furthermore, and this was highly important, he realized that his scheme of maneuver would work even though the Bolsheviks did outflank him from the north. It was purely a question of timing—who could strike first and strike home? Let the strategists pick out the decisive points here. There are several. Each side has its own potential decisive points. But the true decisive point will be a product of location of forces and time and speed of attack. Hence, Pilsudski was not stampeded by the cries of the incompetent. He coolly estimated that his attack could and should be launched on the 16th—a day earlier than scheduled. He clung grimly, defiantly to his original plan in the belief that he could strike home before the Bolshevik sickle in its wide sweep could cut down his Fifth Army and sever his line of communication, or before the Red hammer could crack the defense of Warsaw. Developments went on with amazing rapidity. By August 16th the Polish Fifth Army was enveloped and Warsaw, defiant, awaited the final fatal blow of the hammer and the last lethal cut of the sickle (see Figure 33).

But the Poles still had a card to play. Early in the morning of the 16th August their maneuvering mass hit the Mozyr Group (see Figure 34). This Mozyr force was Toukhatchevsky's protection for his left flank and line of communications. It was strung out in single column

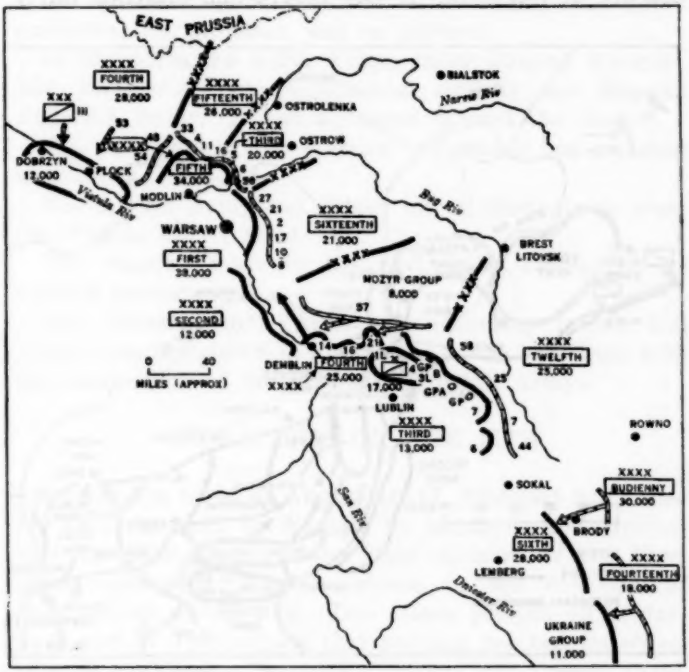

FIGURE 33.—General situation August 16th.

parallel to the Wieprz. When the Fourth Army, led by the hard riding Pilsudski, began its impetuous attack to the north it engulfed and defeated this hapless Russian force. By 3:45 AM the 14th Division had already won one engagement. By 11:00 AM their advance guard,

moving in trucks, was in front of Garwolin, which it soon captured.

At 2:00 PM Pilsudski found the main body of the 14th Division several miles south of Garwolin. He ordered its commander to take Kolbiel with his advance guard. By 10:00 PM the main body of the 14th Division was bivouacked at Garwolin. It had fought and marched thirty

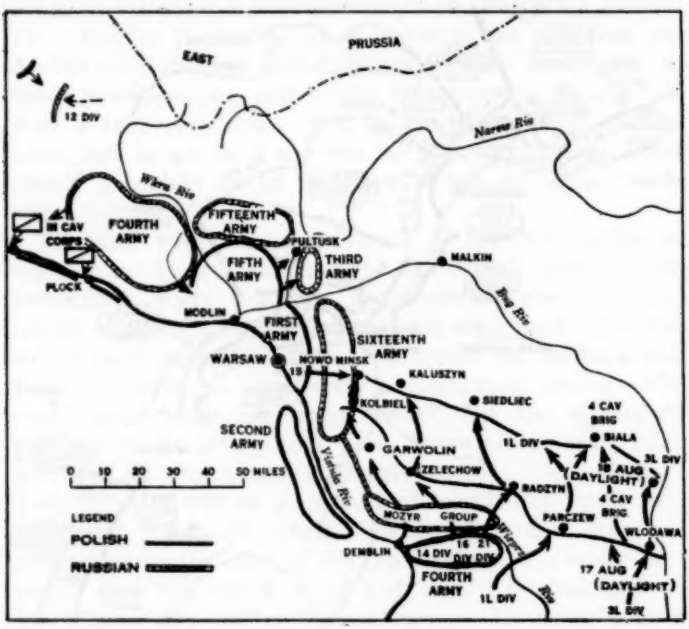

FIGURE 34.—Initial operations of Polish counteroffensive.

miles since daylight. But Pilsudski was not content with this progress. At 4:00 PM, two hours after the advance guard had been ordered to move from Garwolin and take Kolbiel, Pilsudski was questioning its commander as to why he had gone into bivouac. The reason given was that the Russians had stopped the advance. Pilsudski immediately ordered these tired Polish troops to make a night at-

tack. This attack drove the Russians back in confusion on Kolbiel. At 2:00 AM the Polish advance guard, consisting of one regiment with a battalion of artillery attached, was half-way between Garwolin and Kolbiel. By daybreak it had defeated two Russian brigades, the last one just south of Kolbiel.

On the morning of the 17th, after twenty-four hours operation, the situation was as follows:

In the north the Fifth Army, under General Sikorski, had successfully counterattacked against the Russian Fifteenth Army. It had advanced toward the Narew.

The defenders of the Warsaw bridgehead had repulsed all attacks.

The Second Army had driven off all attempts to cross the Vistula on its front.

The Russian mass in the north was continuing its turning movement.

The Polish Fourth Army (maneuvering mass) had reached the line shown in Figure 34. It was in contact with the south flank of the Russian Sixteenth Army.

OPERATIONS ON THE 17TH

During the night of August 16/17, Pilsudski had called his Chief of Staff in Warsaw by telephone and directed that the 15th Division—the right division of the First Army defending Warsaw—attack in the direction of Nowo-Minsk on the 17th. This attack jumped off at daylight and at 7:00 o'clock that evening reached its objective, Nowo-Minsk. The 14th Division was already there. The advance guard of the 14th Division had moved out from its area at 5:00 AM. By night the maneuvering mass, together with the 15th Division, had defeated the southern wing of the Russian Sixteenth Army. This army was retreating. Its rear-guards were no longer in contact with the defenses of the Warsaw Bridge Head.

In the north the Fifth Army had reached the line of the Narew. Its center was at Pultusk.

The Russian III Cavalry Corps and Fourth Army continued the envelopment of the north Polish flank.

OPERATIONS, AUGUST 18TH-25TH

On the 18th, under the impetus of Pilsudski's impelling personality, the Polish maneuvering mass drove hard to

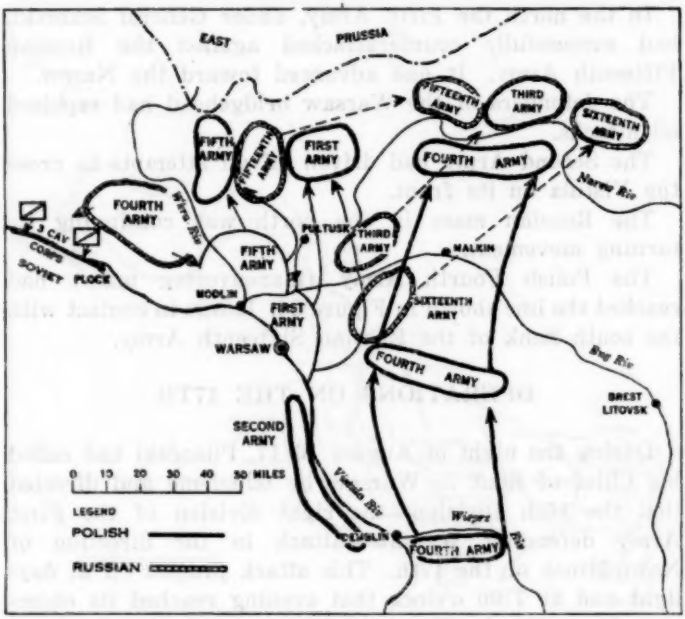

FIGURE 35.—The result of the advance of the Warsaw force (First Army).

the north snapping, one by one, the communications of the Soviet Armies to the west. It smashed at the Russian Sixteenth and Third Armies. The Russians began to waver. (See Figure 35.)

Pilsudski now turned his attention from the 14th Divi-

sion, the Fourth Army, and the maneuvering mass. He began to manipulate his armies. He ordered the Warsaw defenders to attack. By night on the 18th, they had destroyed the retreating south wing of the Russian Sixteenth Army. Sikorski, with his Fifth Army, had advanced as ordered to the north and had cut the lines of communication of the Russian Fourth Army. The Russian Sixteenth, Third, and Fifteenth Armies were in full retreat. The wavering Russians now began to reel.

The Russian III Cavalry Corps and Fourth Army were still continuing their envelopment.

The Warsaw group, pivoting on Warsaw, moved rapidly north of the Bug and tried to box in the Russian Fifteenth Army (see Figure 35). The Russian Army, recoiling from this attack and striving desperately to extricate itself, moved east only to meet the savage onslaught of the maneuvering mass which pinned it down and delivered another blow.

The Polish Second Army, marching at a rate of forty miles a day, pushed toward Brest-Litovsk and then drove north for East Prussia to further block the retreating Russians (see Figure 36).

Pilsudski had gauged the endurance and morale of his soldiers superbly and the rejuvenated Poles, on fire with his inspiring leadership and dynamic energy, swept onward. In a frenzy of patriotic fervor they marched thirty and forth miles a day as they pursued.

In the north the enveloping Russian Fourth Army and III Cavalry Corps were trapped and, after a desperate attempt to escape, were destroyed or fled into East Prussia. The Fifteenth Army was captured or destroyed. In nine days the victorious Russian armies, completely surprised by a powerful counteroffensive, had been defeated and driven in a rout toward the northeast while the Polish Armies like a pack of wolves harried them day and night. Of the twenty-one divisions advancing to attack August 12th, seven were captured, six were broken up, and the remainder were fleeing in dire dis-

order. Thousands of Russians fled across the border into East Prussia to escape the relentless pursuit. Sixty-six thousand prisoners, two hundred and thirty guns, and a thousand machine guns fell into the hands of the Poles.

All this occured while Budienny, who might have saved the situation by a thrust northwest, was intent on cap-

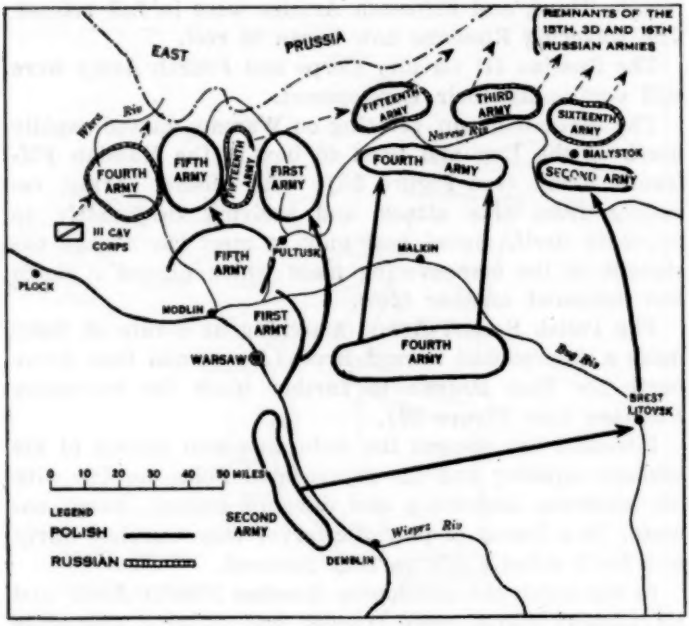

FIGURE 36.—The movement of the Polish Second Army and final collapse of the Russian Army.

turing Lemberg. When he did awaken to his opportunity, it was too late. The Russian right wing was done for and the Poles turned their attention to Budienny and roughly handled him before he could get away.

The Russian Army was wrecked, beyond redemption, and Poland was saved.

Again we turn to the teachings of the Command and General Staff School for an analysis of the strategical principles used here:

"Surprise is the most deadly of all weapons."

"Be stronger at the decisive point."

"In theory, as the lines of communication of both armies are uncovered by the maneuver, it would appear logical that the correct counter move of the army whose communications are in danger would be to strike in turn those of its enemy. In practice, however, this does not obtain."

"No strategy can compensate for the mistakes made on the field of battle."

PILSUDSKI VERSUS TOUKHATCHEVSKY

Pilsudski, regardless of minor blunders, had achieved three great essentials for success: *first*, surprise; *second*, a maneuvering mass on the flank of the enemy directed at the enemy's lines of communication; and *third*, proper timing of the attack. Moreover, through the force of his personality, he was able to adhere to his basic plan and make it work. He did not trust to chance or orders from the rear; he led the maneuvering mass himself. Here we see a demonstration of good generalship and good leadership—a combination not as common as might be expected.

Toukhatchevsky, on the other hand, had as good, if not a better strategic conception, but was unable to force his will upon his subordinate commanders. Therein lies the difference between the two. When Toukhatchevsky set his armies in motion by his orders of August 8, he at the same time lost control. Thereafter, unable to meet changes in the situation through this lack of control, he was risking defeat if the Poles attempted the unexpected —which they did.

Both commanders based their decisions on what they believed would be the intended operation of their oppon-

ent, rather than on that of the opponent's capabilities. Pilsudski believed that the Russian mass would be sent against Warsaw. He did not take into consideration, initially, a strong threat against his left flank which was well within Toukhatchevsky's capabilities. Toukhatchevsky clearly saw his opportunity but seems to have underestimated his opponent's recuperative power and ability to undertake a counter-offensive. He failed to protect adequately his own line of communications and secure coordination with Budienny. His fault lies not so much in his conception of what to do, but in his execution.

It would seem that Pilsudski's offensive mass of maneuver was small compared to the force used initially on the defensive. But in the last analysis, Pilsudski won the battle because he struck with complete surprise at the enemy's flank and rear. The size of the force was not the criterion in this case, although, as we have seen, it was sufficient. It was the *unexpectedness of the blow* from *a supposedly demoralized foe* that turned the tide and won a brilliant success for the Polish Army.

The battle of the Vistula deeply stirs the imagination. It is no wonder that it has been called by some the 18th decisive battle of the world. The Poles faced a situation so desperate that to the trained military observers it seemed hopeless. Yet in a few short days with a simple though risky plan they won an astounding victory and re-created a great nation.

And this was possible because one man—Joseph Pilsudski—made a decision, held tenaciously to that decision, and inspired his soldiers to carry it out. That is genius.

[Editor's Note: Toukhatchevsky after this battle rose to great power in the Russian government, becoming not so long ago one of the first Soviet marshals ever created. In the last few weeks news accounts have related that he lately had been secretly tried and shot.]

CHAPTER 3

Machine Guns in Defense

(INFANTRY SCHOOL TEACHING)

Machine guns—ubiquitous yet invisible—have remade the modern battlefield. To infantry officers, who must fight with and against them, no subject could be of more absorbing interest. A thorough knowledge of the combat role of machine guns will illuminate tactics. A study of these tactics should start with the defense, for, after all, it is the defensive disposition that gives the attack its contour. When the defensive tactics of machine guns are understood, it is not difficult to understand why certain offensive tactics are necessary. This chapter, consequently, will deal with the combat role of machine guns in the defense.

An organization may go on the defensive for a number of reasons but, whatever the reason, the purpose of the defense is always the same—to stop the attack in front of the battle position by the combined fire of all available weapons. If the enemy enters the battle position the defenders attempt to eject him, so that the end of the battle will find the position entirely in the hands of the defenders.

The efficiency of the defense is maintained by allotting to each unit and each type of weapon, the missions for which it is best fitted. The characteristics of the machine gun make it extremely valuable for defense purposes. In fact, the defense is the most favorable type of action for a machine gun. Its most serious limitation—its comparative lack of mobility while being carried by hand—is mini-

mized in the defense, while its most favorable and unique characteristics can be employed to the best advantage. These last are: its large volume of fire, which can be applied suddenly; the suitability of its long narrow beaten zone for enfilade fire; the ease with which the gun is concealed; and its fixed mount which enables it to fire effectively at night. These marked characteristics make the machine gun, on the whole, the most effective defensive weapon in the hands of the infantry.

This fact is well recognized in Field Service Regulations which declare that, "Machine guns constitute the *skeleton* of the defense." Further, the regulations state that machine guns should be so sited that they cover, as nearly as practicable, the entire front of the main line of resistance with continuous bands of grazing fire, while at the same time being capable of delivering long range fire during the hostile approach, and of taking under flanking fire hostile elements which succeed in penetrating beyond the main line of resistance. This triple role the machine gun performs as no other weapon could.

The importance of machine guns in the defense is indicated by the care with which the attacker's intelligence service seeks out the location of defensive machine guns. This information is necessary in order that fire may be concentrated so as to neutralize machine guns and thus afford the attacker some chance of advancing. For no advance is possible over ground swept by machine-gun fire.

The machine gun is directly responsible for the appearance of the tank. During the World War, the opposing armies were stalemated due, primarily, to machine-gun fire. Artillery could not neutralize all guns, because their locations could not be determined, or keep them neutralized until the attackers reached them. Yet some means had to be devised for crossing the ground swept by machine-gun fire. Something was necessary to get forward and root out the guns. The result was the tank—an armored machine-gun destroyer.

From the above it should not be taken that there is little to the defense but machine-gun fires; such is not the case. There is a job for every weapon. But the defensive strength of machine guns should never be forgotten in planning a defense or maneuvering for an attack.

However, there are seldom enough machine guns to cover every approach to a position, nor can they cover all ground over which the attacker must move. This is especially true with our present experimental infantry regiment in which the machine-gun company has only eight guns. This paucity of guns may often require that separate missions be assigned to certain guns—especially those guns in the rear areas. Often there will be dead space which cannot be covered by the flat trajectory of the machine gun. Furthermore, riflemen are needed to provide that decisive element of the defense, the counterattack. Thus, it can be seen that only by assigning proper tasks to all weapons and units will an effective defense be obtained. There are plenty of missions for rifles, light machine guns, mortars, and artillery. But, stated practically and without exaggeration, it is not too much to say that machine guns, because of their great defensive powers, should be given particular consideration in building the defense plan. They, it should be remembered, provide the skeleton of the defense by protecting the keypoints throughout the width and depth of the position—a major task.

POSITIONS IN DEFENSE

Machine-gun positions for the defense generally will differ considerably from those selected for the attack, largely because of the localities upon which they must fire. In the attack, machine guns are concerned with firing upon enemy positions which are usually a considerable distance away and upon commanding ground. They are not particularly concerned with ground close to the front line. In selecting attack positions, sight defilades, and sometimes position defilade, are desirable. But when guns are in sight or position defilade there is usually dead space

in the immediate front. For this reason in defense such positions will be inexpedient, especially for those guns which have the mission of placing flanking fire in front of the front line. Instead, the forward guns will usually be forced to occupy forward slope positions, so as to obtain flanking and grazing fire and to eliminate dead space.

There are three main factors to be weighed in selecting defensive gun positions. First the guns must perform their missions. This will mean that forward guns must be able to deliver enfilade fire and also have good forward sectors of fire, comparatively free of dead space. Second, they must stay in action, which requires concealment. Third, they must exert a continuous influence on the battle. This requires disposition in depth.

It was stated above that usually positions in sight or position defilade are not suitable for the defense. However, under certain favorable conditions of terrain they may be used. For instance, a keypoint may be located slightly in rear of other keypoints on the position, so that guns located on the reverse slope of these other and forward keypoints may protect the rear keypoint by fire (See Figure 37).

This affords an ideal position. The enemy attacking towards the keypoint A will be held up by machine-gun fire from the reverse slope of B. The troops held up will have difficulty in locating, and still more difficulty in neutralizing the gun since they cannot readily maneuver against a gun not in their zone. To be sure, troops can maneuver outside their zone but this is difficult and often impossible, particularly when units are abreast and in contact with the enemy. Troops attacking against B will not be able to locate the gun since it is on the reverse slope and very likely protected against fire from the front. Thus only when the troops attacking B take the position will the machine gun be neutralized or forced to move.

ANALYSIS OF MACHINE-GUN POSITIONS IN DEFENSE

The following are the factors that should be considered in selecting defense positions:

1. *Fire effect to accomplish mission:* This depends on the sector of fire, dead space, interference by trees, bushes, and the like, possibility of clearing, flanking and grazing fire (final protective line for forward guns), interference by or with troops.

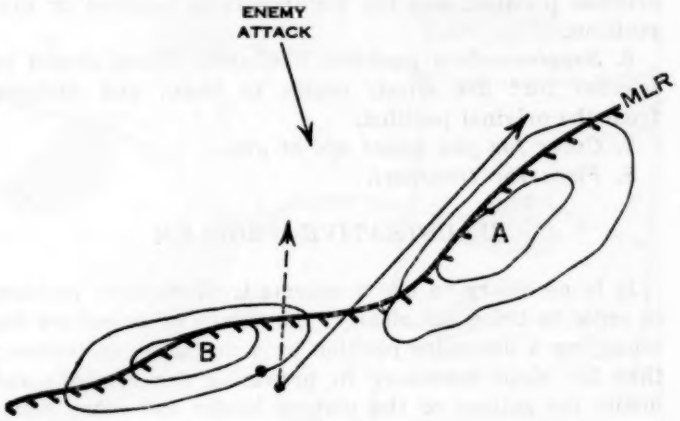

FIGURE 37.—Reverse slope position in defense.

2. *Safety for guns and personnel:* This depends on cover (natural or provided by camouflage), avoiding prominent landmarks; protection afforded by near-by rifle troops, or, where possible, placing guns within combat groups; procuring defilade where practicable; avoiding, if feasible, combat groups likely to be overrun; procuring protection from tanks by natural obstacles; concealing muzzle blast and flash; dissipating sound by use of defilade or by firing from the flank; concealment from air;

distributing guns far enough apart to avoid destruction by one shell (20-100 yards).

3. *Routes:* These are needed for occpuation of position, for supply, and for movement to alternate and supplementary positions.

4. *Control:* This is best provided by distributing guns in depth and providing routes between sections and guns.

5. *Alternate positions available:* These should be selected for comparative fire effect, routes to them from original position, and the distance from original or first position.

6. *Supplementary positions available:* These should be selected for: fire effect, routes to them, and distance from the original position.

7. *Cover for gun squad not at gun.*

8. *Place for transport.*

ILLUSTRATIVE PROBLEM

It is necessary to use a schematic illustrative problem in order to bring out clearly: the details of procedure for occupying a defensive position by a machine-gun platoon; then the steps necessary in preparing for combat; and finally the actions of the platoon leader and other members of the platoon during various stages of an enemy attack.

SITUATION

Our attack is stopped by hostile resistance (See Figure 38). Orders are received to dig in and assume the defensive. A machine-gun platoon has been supporting the left assault rifle company of this battalion.

ORGANIZATION FOR DEFENSE

The machine-gun platoon leader immediately disposes his platoon to cover the reorganization of the rifle company (See Figure 38). This is step one. At this stage of

combat the rifle company may be low in combat effectiveness because of disorganization and casualties. Thus the burden falls on the machine guns and they must be used boldly to cover the rifle company in case of a counter-attack. For this reason, at least one section should be placed well forward so as to obtain flanking fire in front

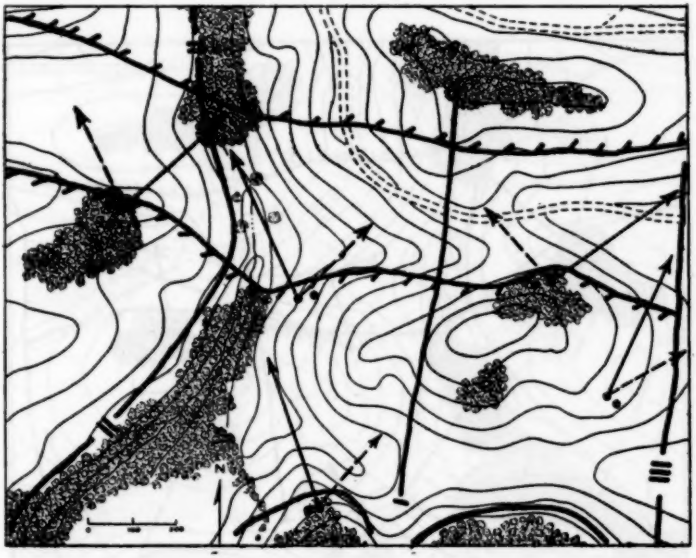

FIGURE 38.—First location of machine guns when our attack stops.

of the position of the rifle company. In this situation the platoon leader places one section in the front line, and one section back near the rear elements of the company and in this manner obtains depth and protects the left flank of the company.

Concurrently, steps are taken to reorganize the machine-gun platoon. This includes replacement of leaders

and key men, where necessary, redistribution of men in squads, and replacement of ammunition and equipment.

COORDINATION

As soon as the units have been reorganized, the position is organized and fires coordinated. This is step two.

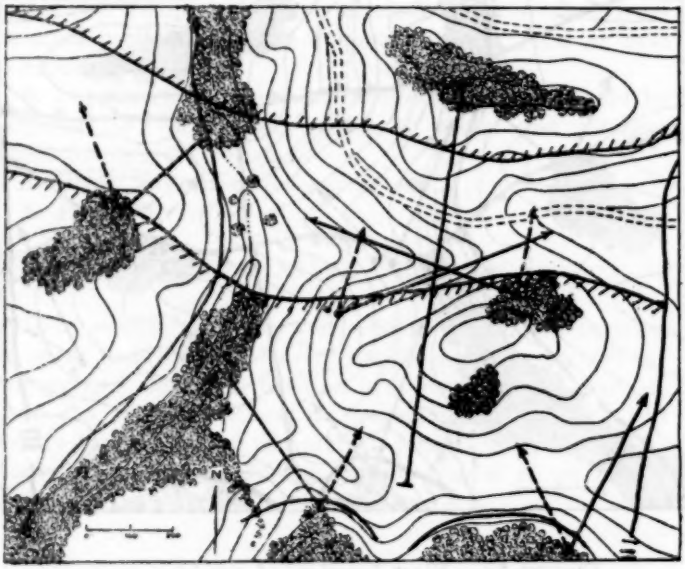

FIGURE 39.—First coordination of guns by local commanders.

The initial locations of the guns may not be the best and later may require readjustment to secure greater fire effect and safety. This will be done ultimately by the battalion commander who will, sooner or later, reconnoiter the area accompanied by the machine-gun company commander.

But to secure complete coordination throughout the battalion area may take some time. Meanwhile, local com-

manders will effect such temporary coordination as is possible (See Figure 39). It is the duty of these subordinate commanders to place their units on an effective footing as soon as possible in order to repel any counter-attacks before complete organization is obtained. Therefore, with this in mind, the machine-gun platoon leader will confer with the platoon leader of the other platoon

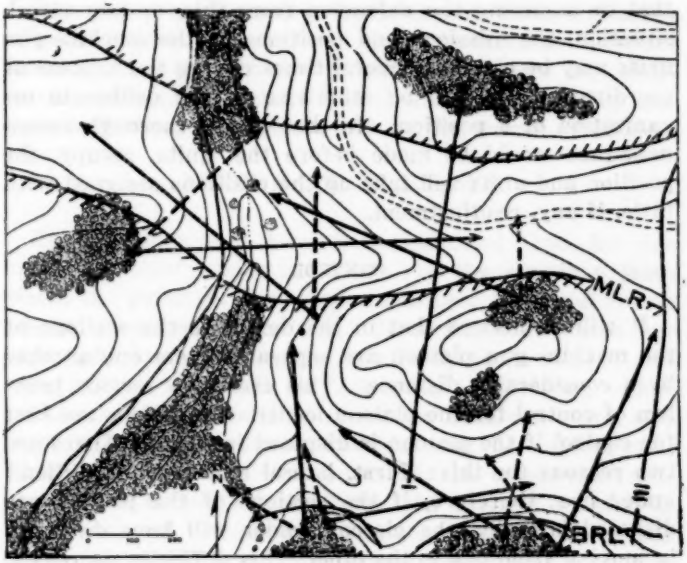

FIGURE 40.—Final coordination of guns by battalion or higher commander.

of the machine-gun company and between them they will arrange such temporary coordination as is feasible. For instance: in this situation we will assume that the forward section of the left machine-gun platoon can cover more effectively the front of the right assault company than it can cover its immediate front. On the other hand, the forward section of the right machine-gun platoon can

cover more effectively the front of the left assault company. Therefore, to further efficient defense an exchange of fires would be arranged by platoon leaders.

Following upon the inspection by the battalion, or other higher commander, the final step is taken and further changes may be made. For instance, the regimental commander may direct an exchange of fires with the battalion on the left (See Figure 40).* It can be seen, therefore, that in assuming the defensive from this, or any attack situation, the missions and positions of the machine-gun units may be changed several times during the process of coordination. It will be otherwise in the deliberate organization of a position. In that case a thorough reconnaissance would be made before the units occupy the position and units will take up the positions assigned with little, if any, readjustment.

CONTROL

It will be noticed that in the defensive the sections of the machine-gun platoon are separated from one another by a considerable distance. This creates a serious problem of control for the platoon leader. Conditions are best for control if the platoon is disposed in depth. There are two reasons for this: First, lateral movement is difficult under fire; therefore, if the sections of the platoon are disposed laterally, the platoon leader will have difficulty in moving from one to the other. This difficulty decreases, somewhat, if there is time to prepare connecting trenches. Second, if the platoon is in depth the crisis of the action for each section probably will occur at different times, thus giving the platoon leader an opportunity to be with first one section, and then the other during its critical period.

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*Note in Figure 40 that the machine-gun section covering the front of the battalion from the sector on the left has an ideal position, being on the reverse slope yet able to fire flanking fire in front of the main line of resistance.

In any case this distance between sections, and to a lesser degree between squads, will require that detailed instructions to sections and squads be issued before the defensive battle commences, because, thereafter, subordinate leaders will to a great extent be "on their own." Detailed fire plans must be prepared and understood by all personnel in order to take care of any eventuality that can be foreseen.

But in battle, it must be remembered, most situations are unforeseen. Therefore, previous combat practice training must be such that subordinate leaders are inculcated with courage, initiative and energy so that they can cope with the unpredictable and normal events of battle.*

ALTERNATE POSITIONS

The positions that have been indicated thus far are called principal positions. They are the positions from which the principal fire mission can best be executed and are the ones usually occupied. However, guns which fire repeatedly from one position are likely to be located and once located, they will be destroyed. Therefore, other positions must be found to which the guns can move, and from which the assigned missions can be carried out. These are called *alternate positions.* In occupying these positions it should be noted that the original mission is not abandoned. From the alternate positions the guns must still be able to cover the same hostile area with fire.

What then are the requirements of an alternate position? First, it must carry out the original mission. This will usually mean that the distance the guns may displace is limited, because a position greatly removed from the principal position usually will not enable fire to be placed on the required area. This is especially true in close wooded country. At the same time, however, the alternate position must avoid the fire directed at the principal posi-

*This will be strikingly demonstrated in the historical example related in the following chapter.

tion. Therefore, the minimum distance between original and alternate position should not be less than 50 yards; more is desirable. The second requirement is a covered route from the principal to the alternate position.

The question that next comes up is, who orders the movement to the alternate position? Obviously the occasion for the move is an emergency and the movement must be made promptly; therefore the leader on the spot should order the move. If the platoon leader is present at that section or gun, he will order the move; if not, the section leader or in exceptional cases the squad leader will give the order.

Having decided to move, how is the movement carried out? It is desirable to move one gun at a time in order to keep some fire upon the assigned area. However, even if only one gun of the section appears to be located, the fire directed at it may endanger the other, and both may have to move promptly and even simultaneously.

SUPPLEMENTARY POSITIONS

The plan for the defense of a position should include the measures to be taken in case the enemy advances through any of the possible approaches into the position. However, the most likely enemy plan is the one which determines the actual location of the guns and their principal positions. To be sure, other positions are selected and prepared for the section, but these will be occupied only when orders are received to move the guns to meet an attack from an unlikely direction. These are called supplementary positions.

Two differences will be noted between a *supplementary* position and an *alternate* position. In a supplementary position fire is to be delivered upon an area other than that of the principal mission; and the guns are not forced to move by fire directed at the principal positions. (Neither of these factors apply to the siting of an alternate position.) There is no reason, therefore, why the supplemen-

tary positions cannot be close to the principal positions; in fact the closer the better, since the time required for changing positions is shortened. As in the case of alternate positions there should be a covered route between the positions.

It is important to note that since the movement to supplementary positions disarranges the original plan of defense, theoretically the commander who planned the defense and assigned the principal missions should be the only one to order any such radical readjustment. Actually, in case of a sudden emergency, when there is no time to receive orders from the responsible commander, the platoon leader may have to make the decision upon his own initiative.

DUMMY EMPLACEMENTS

In order to draw enemy fire from occupied emplacements, dummy emplacements are constructed at such distances that fire directed at them will not endanger other installations.

PREPARATION OF POSITIONS

As soon as machine-gun units arrive at their positions work is begun in preparing the positions for defense. If the enemy is in contact, the work must be executed while taking cover and at night. If not in contact, the work may progress more rapidly and systematically. For the purpose of this problem we will assume that the outpost prevents the enemy from interfering with the work.

The first step in the preparation of the position is the bringing up of an adequate amount of ammunition and other supplies. Next, tasks are assigned to members of the platoon according to the following priority:

First, work will be started upon the principal emplacements, clearing of fields of fire and shelters for the high-

er numbered members of the squad.* All this work will proceed simultaneously. The emplacements at first will be shallow, concealed with camouflage, and later deepened to standing emplacements. Finally, as time becomes available, they are made splinter and bomb proof. The gunner and assistant gunner of each squad are used initially in this work, thus they are immediately available at the gun in case of an emergency. They will use the pick and shovel on the squad transport until engineer tools become available.

Two members of each squad are usually assigned the task of clearing the essential fields of fire for the section, although this depends somewhat upon the amount of clearing necessary. They should use initially, the large hatchet on the squad transport, and the hand axe. The clearing is limited to cutting bushes and low limbs of trees. The trees themselves are left standing because they interfere less with the field of fire when standing than when cut down. The clearing must not disclose the position nor the camouflage. Anything like straight lines marking the limits of clearing must be avoided.

The remaining available members of the squad are placed on shelters. These shelters will start as kneeling rifle pits, being improved as time becomes available. These men use individual entrenching tools until engineer tools become available.

After the work in the first priority has been finished, work is commenced on alternate emplacements and routes to them and to the principal emplacements. These routes are in the form of crawling communication trenches which are deepened later, as time allows, and tied in with other trenches being constructed by rifle companies.

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*In machine gun squads, which are numbered from 1 up, number 1 is the gunner and number 2 is the assistant gunner. These men should be sheltered in the emplacement; therefore, other shelter is needed for men who bear higher numbers than 1 or 2.

Next in priority are the supplementary emplacements, and routes thereto, and finally dummy emplacements. It should be emphasized here that work is never finished in the organization of the position. The improving of the various installations is continued so long as the position is occupied.

Obstacles will be constructed when material becomes available. Under the present experimental organization of a machine-gun company, very few men will be available for actual work on obstacles, this task in general, being performed by reserve or front-line rifle units. However, machine-gun units are vitally interested in the location of the tactical wire because it should be so placed that it can be enfiladed by machine-gun fire. Therefore, the machine-gun company commander should be consulted with reference to its location.

The squad leaders, in addition to supervising the work of their squads, receive instructions from their section leaders and platoon commander and immediately start the preparation of range cards. These should be completed as soon as possible for even though darkness is several hours away, they may be needed should the enemy attack under cover of smoke or when visibility is poor.

Concurrently with the work being done by the platoon, and in addition to the supervision of the work of the platoon, the platoon leader will take additional steps as follows: He will prescribe in detail the fire plan which will include sectors of fire (prescribed by the battalion commander), final protective lines, under what conditions to open fire, the rate of fire, and in general, all instructions necessary for section and squad leaders to engage in combat when the platoon leader is not present.

He will notify the combat group commanders in his vicinity of the exact positions of the guns, their sectors of fire, final protective lines, and particularly the dead spaces existing in these fires. He may also be able to inform them about the fire that other machine-gun units may be able to deliver for their protection. To be sure, a

large part of this information will be received by the combat group commanders from other sources, but, to insure close cooperation, nothing can take the place of detailed information pointed out on the ground.

The platoon leader should send a sketch to the machine-gun company commander showing his positions, sectors of fire, final protective lines, and the dead spaces therein. In addition, as they become available, duplicate range cards for each gun will be sent to the company commander. Finally, the platoon leader obtains from the machine-gun company commander information about feeding his men and, if this information has not been furnished previously, the amount of ammunition to be kept at each emplacement.

CONDUCT OF THE DEFENSE

For the purpose of discussing the action of machine guns in defensive combat it will be simpler if we assume that the front lines of the opposing forces have been in contact for several days.

During this perior the machine guns will carry out harassing missions, principally at night. The purpose of this harassing fire is to inflict casualties, break down enemy morale, and disrupt supply. The points harassed will be critical points in the enemy area such as roads, trails, crossroads, locations of kitchens and command posts. This harassing fire may be executed in two ways: a heavy fire may be placed upon an area for a short time at irregular intervals hoping to inflict casualties before the enemy can take cover; or, a small amount of fire may be placed in the area at irregular intervals continuing for a long period—perhaps throughout the night—thus interdicting that particular route or area. Forward guns do not execute these fires for fear of disclosing their positions. Such missions are executed by guns in the rear part of the battalion or regimental area—or even farther back—and often from supplementary positions.

COUNTERPREPARATION

If it becomes known that the enemy is preparing to attack, rear machine guns put down counterpreparatory fires upon areas likely to be occupied by reserves, the enemy routes of approach and the enemy front line.

ACTION DURING THE ATTACK

The enemy attack usually will be preceded by an artillery preparation during which the machine-gun personnel take cover. The gun crews occupy their emplacements with one sentinel continually observing for signs of the launching of the attack. Some of these signs are: an increase in intensity of artillery fire, a lifting of fire if the line are close, the commencement of machine-gun or rifle fire, and the approach of tanks or the appearance of enemy riflemen. Fire is opened by the machine guns according to the fire plan when remunerative targets appear in their sectors of fire. The first elements to appear will usually be individual scouts and tanks—if tanks are being used in this particular sector. Machine guns do not fire upon such targets as these. If the tanks approach the emplacements, guns stop firing in order to avoid disclosing their locations. If located, the gun will be lowered to the bottom of the emplacement to avoid being crushed by the tank. The crew also takes cover on the bottom of the emplacement. As soon as the tank has passed, the gun is remounted and firing is resumed.

The first remunerative targets will usually be groups of riflemen following the scouts into the outer limit of the sectors of fire. Guns engage these or the areas where they take cover. As the attack progresses, the fire of the guns will become more and more enfilading. Finally, when the attack reaches our tactical wire, the guns will be firing along their final protective lines just outside the tactical wire. If the enemy should locate any guns during the attack, these guns must be moved promptly to alternate positions.

If the enemy should penetrate the position and capture certain combat groups, guns which are able support counterattacks to regain them, moving to supplementary positions if necessary for this purpose. If enemy personnel suddenly attack the emplacement at close range, the guns use swinging traverse.

Upon signal that the enemy is attacking, guns in rear put down their normal barrage.

If low-flying airplanes attack the position, machine guns in rear engage them. Whether or not the forward guns should do so depends upon the importance of the ground targets being engaged, and whether the action will disclose their position to the enemy.

REORGANIZATION

After the attack has been repulsed, the platoon leader reorganizes his platoon. This includes the replacing of leaders and key men, redistribution of personnel, replacing of equipment, repairing of damaged emplacements, evacuation of wounded, replenishment of ammunition, and the cleaning of equipment.

CHAPTER 4

A Machine Gun Defense at the Marne

(AN INFANTRY SCHOOL HISTORICAL STUDY)

During the last months of the World War American troops usually were attacking and seldom had to meet a general German offensive. True, many time American units were forced temporarily to go on the defensive to resist counterattacks or small local offensives, but, on the whole, our troops played an assault role. Yet once the Americans did meet a planned major offensive of the Germans, and stopped it with such a jolt that the vibrations reached German G.H.Q.

In 1918 the famed von Hutier assault tactics had been uniformly successful against both British and French. But finally the French, by maneuvering their defense, learned the effective counter and stopped the last German offensive. For this the French justly receive much credit, but one American Division, the 3d, stood up to this last German offensive and fought it out on the ground, and by sheer fighting power and tenacity completely broke-up the attack on its front.

This defense taught a lesson, the signficance of which the German high command clearly saw. They found then, and later, much to criticise in American attacks, but are unanimous in testifying that the Americans on defense were truly formidable. Ludendorff, himself, admites that fact. German war time intelligence reports show that there was a healthy respect, if not dread, for the American in defense. He was tough. In all this, one significant fact

stands, out: The Germans, from Ludendorff down, attribute the American success in defense—aside from sheer courage and tenacity—to the skillful handling of machine guns.

This being so, it may be of value to look at the American side of the picture—to see how one machine-gun company of the 3d Division helped to stop the last great German offensive.

SITUATION

During the early part of July 1918, the 3d Division occupied a defensive position south of the Marne. The 30th Infantry occupied the sector shown in Figure 41. The forward part of the regimental sector was occupied by the 1st Battalion, with Company K and the Regimental Machine-gun Company attached. In addition, trench mortars, 37-mm guns, and one 75-mm gun were in this area.

However, this chapter is chiefly concerned with the action of machine guns in defensive combat. Consequently, the machine-gun action is given in detail. But this detailed account of machine-gun employment should not lead to the impression that machine guns did all the work. The success of the defense can be attributed to the combined action of all weapons. In fact, an excellent account of the effect of rifle fire in this battle can be built-up from the historical material on hand. But here machine guns did do an outstanding piece of work and with this alone, at this moment, we are mainly concerned. For this reason all other details are subordinated, or sketched in only enough to furnish a background.

The line of resistance of the forward area, or 1st Battalion sector, ran along the forward edge of the woods just east of Bretonnerie, and was known as the Aqueduct Line. An outpost line was along the river (see Figure 41). Orders prescribed that not more than four machine guns in any battalion sector be placed in front of the Aqueduct Line. This was in order to retain eight guns on the Aqueduct Line. However, because of the extent of front caused

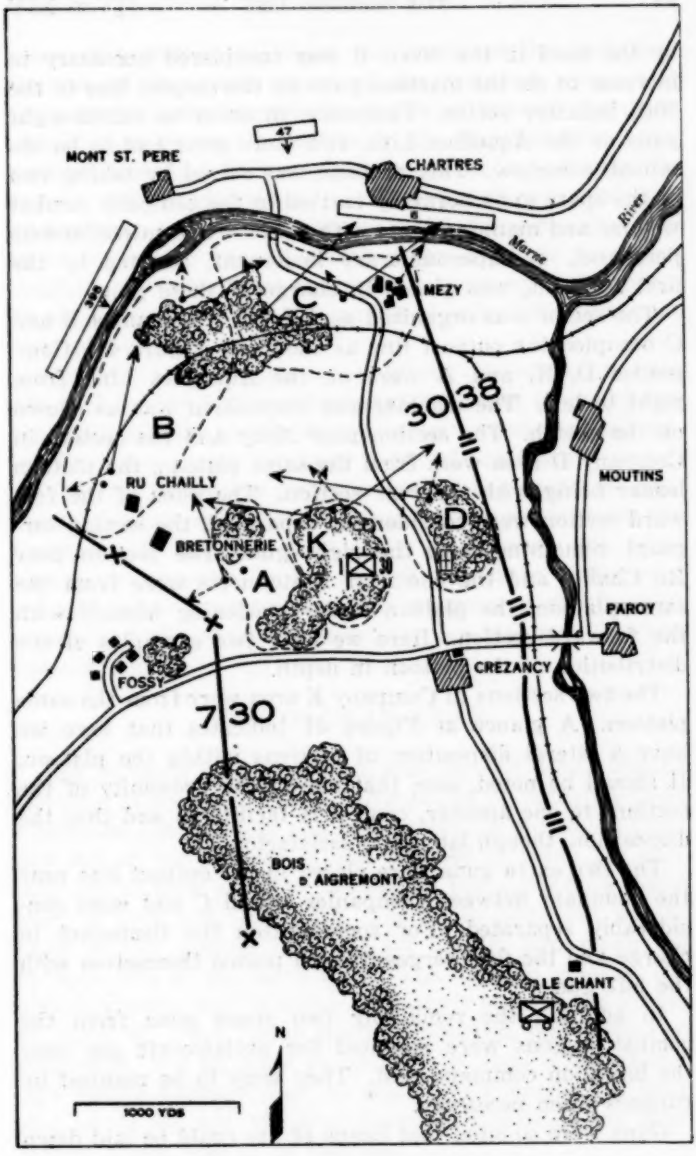

FIGURE 41.—Sector of 30th Infantry.

by the bend in the river, it was considered necessary to increase to six the machine guns on the outpost line in the 30th Infantry sector. Therefore, in order to retain eight guns on the Aqueduct Line, two more guns had to be obtained, somehow. This problem was solved by taking two of the spare guns normally carried in the company combat wagons and manning them with runners and miscellaneous personnel. A supernumerary lieutenant, assisted by the first sergeant, was placed in charge of these guns.

The sector was organized as follows: Companies B and C occupied the outpost line as shown in Figure 41. Companies D, K, and A were on the Aqueduct Line from right to left. The machine-gun disposition was as shown on the sketch. The section near Mezy and the section in Company D area were from the same platoon, the platoon leader being with the rear section. The guns of the forward section were considerably separated, the section sergeant remaining with the right gun. The section near Ru Chailly and the one near Bretonnerie were from the same platoon, the platoon leader stationing himself with the forward section. Here we have two examples of the distribution of the platoon in depth.

The two sections in Company K area were from the same platoon. A glance at Figure 41 indicates that here we have a lateral disposition of sections within the platoon. It should be noted, also, that due to the proximity of the sections to one another, control is facilitated and thus the disposition, though lateral, is satisfactory.

The two extra guns were placed in the outpost line near the boundary between Companies B and C and were considerably separated. For some reason the lieutenant in charge and the first sergeant, both posted themselves with the left gun.

In addition the remaining two spare guns from the combat wagons were mounted for antiaircraft use near the battalion command post. They were to be manned by runners when necessary.

Guns were so sited that bands of fire could be laid down

across the width and along the flanks of the battalion. Because of the great extent of the battalion sector and the nature of the ground the bands of fire did not completely close across the entire front. The battalion commander remedied this, as best he could, by placing the fire of rifles and automatic rifles, trench mortars, and 37-mm guns to cover the intervals. Machine-gun fire was to be opened in case of attack when a target presented itself, or on order from the nearest company commander. At each emplacement 4,320 rounds of ammunition per gun were placed.

The machine-gun company entered the area on July 4th, and for the next ten days occupied itself in improving the positions and in executing a certain amount of harassing fire upon enemy positions north of the Marne.

With the defensive organization of the machine guns firmly fixed in mind, let us turn, for the moment, to the German side and see what their plans were and what chance our organization has to cope with them. Afterward we can follow, step by step, the progress of the German attack and the effect the defensive machine-gun fire had upon it.

THE GERMAN PLAN

The German plan of attack was for the 10th German Division to send over the 6th Grenadiers on pontoons from Charteves, taking Mezy and then extending out to the right and left of the village. It was planned to reach the railway line in time to follow the rolling barrage which would start at 3:50 AM, July 15th. The 398th Regiment was to cross in like manner opposite Ru Chailly and reach the railway line at the same time. The division reserve, the 47th Regiment, was to follow by a newly constructed bridge at Mont St. Pere, enter the line between the other two regiments, and all were to advance on Bois d'Aigremont. The rolling barrage was to move one kilometer an hour and by 11:00 AM the line Blesmes—Courboin, six kilometers south, was to be reached.

THE BATTLE

Near midnight July 14th, American artillery started a bombardment of the German lines. This was not significant in itself since of late the artillery had made it a practice to throw gas shells over all night long. Around midnight, shortly after the bombardment started, the enemy began what seemed to be retaliatory fire. This was intense and all troops took cover. The fire continued steadily—hotly. Soon all wire lines were broken. Meanwhile our own artillery was busy with an equally fierce counter-preparation. Something seemed fated to follow this hot artillery exchange. And it did.

Subordinating all else to the machine-gun participation, let us follow the fight.

MACHINE-GUN ACTION

We must remember that the infantry action which followed the preparation was an affair of rifle platoons and machine-gun sections and squads; each group ignorant, amidst the uproar and confusion, of what was happening elsewhere. This will indicate clearly that the machine-gun defensive task has to be precisely defined and understood prior to the beginning of the action.

In examining the action of the machine guns hereafter we will have to go from group to group. We should realize, however, that much of the action was taking place simultaneously.

ACTION NEAR MEZY

At 2:40 AM the 6th Grenadiers crossed the river on both sides of Mezy. They formed with two battalions in front and one in reserve. Some of the advance elements reached the railway by 3:30 AM. The right forward platoon of C Company had been sheltered in cellars in Mezy during the bombardment. The Germans had already

crossed and passed beyond them before they became aware of it. However they assembled quickly and, fighting as they went, made their way to the railway station at Mezy. The machine-gun squad east of Mezy decided to remain in position and continue firing. Shortly thereafter a minenwerfer, which had been searching the south bank, obtained a direct hit and destroyed the gun. Miraculously, no one in the squad was hurt. The squad was assembled by the section sergeant and fought its was back to the railway station and joined the platoon of Company C already there.

The gun west of Mezy opened fire upon a group of Grenadiers advancing toward it under an officer. These were all hit or dispersed and the officer, slightly wounded, was taken prisoner. Shortly after, another group attacked the position and the gun was forced to move. Dismounting the gun the men crawled along a hedge and set it up in an alternate position. The Grenadiers passed them by.

MONT ST. PERE GUNS

Meanwhile the two guns south of Mont St. Pere became hotly engaged. The enemy was first seen about 4:30 AM at a distance of 150 to 200 yards. They were advancing by rushes through a wheat field. The two machine guns opened up. In the midst of this action, the left gun jammed. While the jam was being reduced a rifle grenade killed the gunner, and wounded the assistant gunner and the lieutenant. This officer had been previously hit by a shell fragment. In spite of their wounds, they managed to get the gun in action after a delay and gradually the German attack in their vicinity was halted and melted away. Later it was learned that the 6th Grenadiers, badly hammered by rifle and machine-gun fire, and their left flank threatened by elements of the 30th and 38th Infantry, had withdrawn to the north bank about 5:00 AM.

About 4:00 AM the 47th German Infantry began to cross by the new bridge near Mont St. Pere. The 1st Battalion advanced in column under the mistaken impression

that the 6th Grenadiers had silenced opposition as far as the railroad line. The machine gun near Mezy ripped into this column as did the two guns south of Mont St. Pere. To this was added the rifle fire from the left forward platoon of Company C. This German battalion sustained tremendous casualties and the survivors hastily withdrew; the battalion was out of the fight from then on. Another battalion of the 47th appeared now at the eastern outskirts of Mont St. Pere, apparently intending to follow the leading battalion across the bridge. The machine guns promptly took this under fire, as also did the rifleman and the combination drove the battalion back.

By this time the guns were out of ammunition. Consequently, the four machine gunners surviving at Mezy, taking their prisoner with them, abandoned the gun and tried to fight their way back. But only one broke through, the others were taken prisoners. They rejoined the company only after the division reached the Rhine. Thus by 6:00 AM both Mezy guns were out of action.

Let us see how the other two guns fared. After the attack of the 6th Grenadiers had been broken and the attempt of the 47th Infantry to cross had been frustrated, a lull in the action ensued. The lieutenant in charge of the section had discovered some days before that the French had left machine-gun ammunition in the swampy wooded area just in rear of his position. He sent a couple of men to collect this and bring it to the gun.

About 8:00 AM the fire of our own artillery descended upon the rifle platoon at this point and forced it to draw back to the railroad line, taking the right machine gun with it. This isolated the left Mont St. Pere gun because the platoons on its left (Company B) had become engaged and were drawn off to the left. The gun was well concealed, however, and the lieutenant decided to stick it out.

At 8:45 AM a battalion of the German 47th Regiment made a second attempt to cross the river over the Mont St. Pere bridge and to the right of it. This succeeded. Elements of the battalion were fired on by our gun south

of Mount St. Pere and suffered severe casualties but they passed to the east of the gun and reached the railway and later joined hands with the 398th German Infantry.

The Mont St. Pere gun remained in action until 11:00 AM, when the squad withdrew, having exhausted its ammunition. It had to fight its way back and was harassed by artillery fire directed by low-flying planes. The lieutenant later died of the wounds incurred early in the action.

ACTION NEAR RU CHAILLY

Concurrently with the action in the other part of the front, a distinct action was taking place in the area occupied by Company B. The 398th German Regiment crossed directly opposite the center of this area by ponton ferry. Our artillery took its toll of this force and delayed its operation so that it did not succeed in landing until 4:00 AM, too late to follow the rolling barrage. The regiment formed with two battalions in front and one in reserve.

The left center platoon of Company B met the onslaught first and the two right platoons, discovering the direction of attack, faced south and engaged in the fight. It was this action of the right platoons which isolated the Mont St. Pere gun. During this time the Ru Chailly guns were enfilading the German attack and causing many casualties. The reserve battalion of the 398th German Infantry was sent against this nest at 5:00 AM.

The machine guns were expending ammunition rapidly. At this time the lieutenant at the guns directed a runner to hasten to the B Company command post at Ru Chailly and send a buzzer message for more ammunition. Upon reaching Ru Chailly the runner discovered that the wires were out. He then decided to press on to the battalion command post. He continued as best he could through the shell fire and arrived at 6:00 AM. A second runner was dispatched from the guns with the same urgent message a half hour after the first. But before ammunition could be

sent to the guns the position had been stormed and overrun. This machine-gun section remained in position to the last and incurred 100 per cent casualties in killed or wounded. The platoon leader was among those killed. The section had done its work, however, because the 398th Infantry, owing to heavy casualties and disorganization incurred during this attack, was not able to resume the attack beyond the railroad until after 8:00 AM—four hours later than planned.

The machine-gun section east of Bretonnerie was in emplacements in the open about 100 yards south of the woods in which was Company A's advance platoon. Both guns opened fire upon the enemy who were attempting to advance from the west. About 5:30 AM some German patrols penetrated the woods east of Fossy and succeeded in flanking one of the guns. The section leader, who was with the other gun, then ordered it out of action and retired. There appears to have been no reason for this as the position had not been dangerously threatened and plenty of ammunition remained. Fortunately, this withdrawal did not alter essentially the progress of events. The rifle fire of Company A was deadly and covered the exposed ground. Furthermore, our own machine guns near Company K held up the German left. The German advance was stopped.

By 6:00 AM, therefore, the 398th German Regiment with heavy losses, had inflicted severe casualties on B Company and had reached the railroad line. Here they stopped to reorganize and try to establish liaison with the 6th Grenadiers on their left. This they failed to do, of course, since the Grenadiers already had been thrown back across the river. However, they later established contact with the 47th.

THE ATTACK ON THE AQUEDUCT LINE

After reorganization, the 398th, in conjunction with the 47th, began the attack upon the Aqueduct Line. The enemy

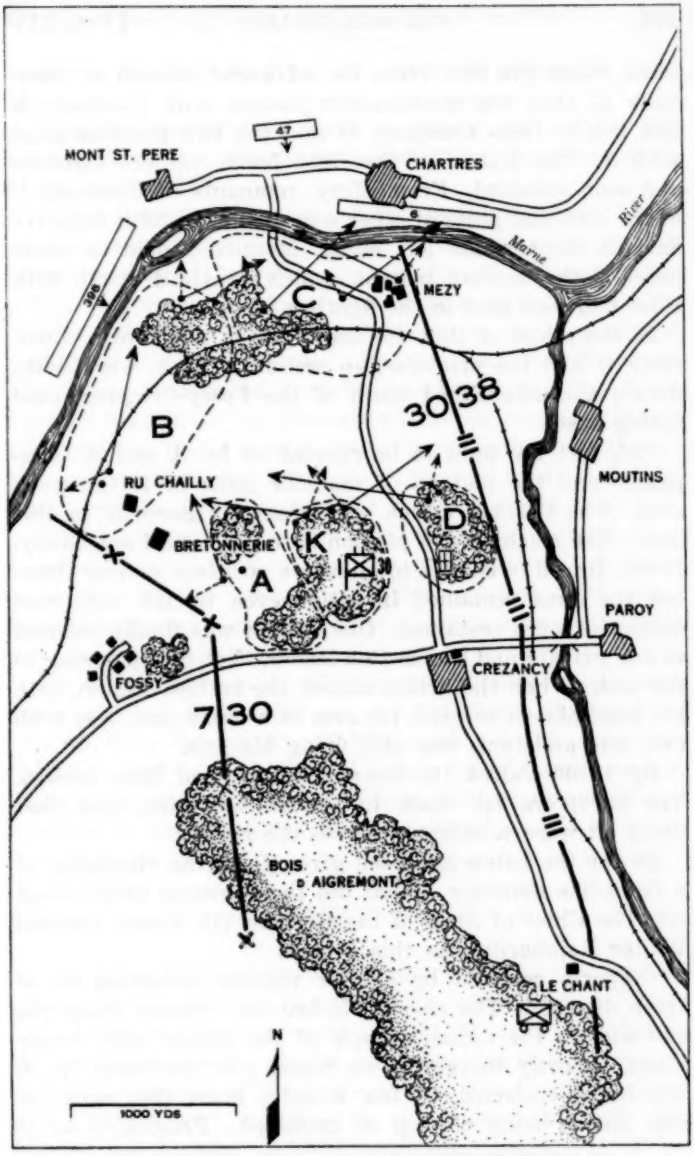

FIGURE 41.—Sector of the 30th Infantry.

came under fire first from the advanced platoon of Company A, then the machine-gun platoon with Company K and finally from Company D and the two machine guns with it. The attack on the right front was not vigorous and soon subsided. From Mezy, remnants of Company C of the 30th and parts of other units from the 38th Infantry harried the German left flank. Mention should be made here of the mortar platoon which provided itself with rifles and took part in the fighting.

In the midst of this, for some reason not known, Company D and the machine-gun section with it, were withdrawn and established south of the Fossy-Crezancy road facing east.

This left the fight to be carried on by A and K Companies and the platoon of machine guns in K Company area. The German attack was pressed vigorously in this area. The machine-gun platoon here performed splendidly. It was forced to change to alternate positions several times but the guns remained in action even though numerous casualties were sustained. One section was finally reduced to one private and the section leader. Yet it kept firing to the end. When the action ceased the section leader, with his hand almost severed, his arm in a tourniquet, and with only one assistant, was still firing his gun.

By 11:00 o'clock the German attack had been broken. The survivors fell back to the railway line, and that night all were withdrawn across the river.

So far the battle has been given from the viewpoint of a front-line defender. What did the Germans think about it? The Chief of Staff of the German 7th Army, General Walter Reinhardt, has this to say:

"Reports received by carrier pigeons informed us of fresh disaster. The enemy blocked our attacks along the railroad on the opposite bank of the Marne with heavy losses. Shortly thereafter we heard that Regiment No. 6 was being encircled. A few minutes later, this regiment was either being cut up or captured. Fragments of it

regained our side of the river, with the enemy in close pursuit.

"Terrific fighting took place all during the day for the possession of the railroad embankment on the south bank of the Marne. ***

"Thus the afternoon passed and evening came. There could be no doubt any more that we had not a ghost of a chance to force the river successfully at this particular point. Accordingly, General von Kathen ordered the 10th Division to retire behind the Marne as soon as darkness facilitated their withdrawal. Although the enemy disturbed the retreat by keeping up a lively artillery fire, the south bank of the Marne had been abandoned by morning. Regiments of the 10th Division, starting out with fifteen hundred to two thousand men, soon paid a heavy toll. Of Regiment No. 6 not more than a hundred and fifty men survived or returned; of Regiment No. 47, about four hundred; and approximately the same number of Regiment No. 398. In the course of the next few days, these figures improved somewhat when missing men made their way back to their units."

Some time later, after other American actions, a report faced General Ludendorff, an extract from which is fitting to close the account of this fight. Of the American soldier it says: "He is skillful in the use of machine guns. In defense, he is stubborn, finding his best means of resistance in his numerous machine guns."

COMMENTS

The most striking feature of this battle is the isolated action of machine-gun units. This brings out in high light the necessity for detailed instructions to subordinate leaders before battle. It also indicates that it is necessary to select carefully subordinate leaders for their initiative and decision, and to endeavor by training to reach the highest development in these qualities. Courage is, to be

sure, a prime necessity but it often takes a battle to determine the existence or lack of this quality.

Note in this action the result of obstinate resistance coupled with the good use of cover. Several of the guns, notably those south of Mont St. Pere and west of Mezy, were so well concealed that the Germans passed them by. They remained in position and were able to do great execution by surprising units in close formation. The demoralization of the two battalions of the 47th Infantry may well have been a deciding influence on the action.

The value of moving to alternate positions was shown by the west Mezy gun and the guns in K Company area. But other guns apparently were doing the same thing to judge from a study made by Colonel Conrad H. Lanza, Field Artillery*, of this German offensive. He gives a vivid picture from the German viewpoint of the handling of American machine guns. Speaking of the German advance, he says:

"They reached Mezy, but were stopped by 6:00 AM near there, by severe machine-gun and artillery fire. They were able to locate some of the machine guns firing at them, and sent messages to their artillery, by runner to the north side of the Marne and thence by telephone, asking for fire on these places. Roughly, it took about an hour to get these messages to the artillery. Some battery was then detailed to fire at the machine guns, and proceeded to do this by a rapid adjustment, on a 200-meter bracket. *The fire was absolutely useless. The hostile machine guns, as soon as they saw anything that looked like a battery trying to adjust on them, immediately disappeared, to appear a few minutes later at a new location.* [Editor's italics.] If these had been the only machine guns, the infantry might have advanced while the guns were changing position, but there were so many of them that the occasional stoppage of fire from one or two failed to

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* *Five Decisive Days,* The Field Artillery Journal, January-February, 1937.

enable an advance to be made. This "hide and seek" business, of trying to locate enemy machine guns, and then notifying the artillery of where they were, and waiting for the artillery to annihilate the machine guns, continued uninterruptedly until about 11:00 AM, during which time the machine guns were never silenced, and the infantry made no advance. By this time losses were so great that the regimental commander found his men breaking to the rear, * * * "

Colonel Lanza's account clearly shows the results that may be attained by the proper selection and use of alternate positions. But, it will be noted, that here the Germans, owing to the river, had great difficulty in communicating with their artillery. Normally, it can be expected that artillery fire will fall with greater promptitude on machine-gun positions, once they are disclosed. This fact, alone, re-emphasizes the vital necessity for alternate emplacements.

Another fact brought into strong relief by this fight, is that in defensive combat casualties do not seriously diminish the efectiveness of machine-gun fire, so long as there is a man to load and fire the gun. Witness the two-man team that kept a gun in action until the end, although one man was seriously wounded.

This action also brings out the fact that great quantities of ammunition are needed in the defense. The French when they occupied this sector had 2,500 rounds at each gun. The Americans increased this to 4,320 rounds but even so the ammunition was running low in several instances before the battle was half over.

The machine-gun company sustained approximately 50 per cent casualties in officers and men in this action of about eight hour's duration. The Germans, as noted before, suffered heavily, yet they never approached the position where the Americans expected to make their stand. Because of good work in the forward position the battle never reached its climax.

CHAPTER 5

The Functioning of the Infantry Staff

(AN INFANTRY SCHOOL TEACHING)

Staff officers are assistants to the commander. Therefore, if we are to understand the underlying principles governing staff organization and function, a clear conception of command responsibility and the command function is absolutely necessary. The controlling head of a military organization is the commander. He alone is responsible to his proper superior for everything his command does—or fails to do. He alone is responsible for all basic decisions, plans, and policies that emanate from his headquarters. This responsibility cannot be shared and it cannot be delegated. In this the staff has no part. It is one man's responsibility, and in order to meet this responsibility the commander must be able to make his authority felt and his will obeyed by each and every member of his command.

Yet it is obvious that personal contact between a commander and the individuals that make up his command becomes more and more difficult as the size of the unit increases. In addition, experience has proven that the number of individuals which a commander can personally supervise and control is extremely limited. How then can the commander—this single controlling and responsible head—effectively direct each of the many individuals composing his command and make his authority felt and his will obeyed by each individual? Manifestly, he cannot do this by personal supervision and direct orders to each

individual, as can a corporal. The commander must have some framework of organization by means of which he may impose his will on a few subordinates, each responsible directly and only to him, so that through them he may be able to make his authority felt down to the last private.

This framework is provided by organizing into successive subordinate groups, each under its own commander, and making each subordinate commander responsible to his immediate superior for all that his subdivision does or fails to do. This succession of subordinate commanders, through whom the commander of the whole exercises his authority and control, is known as the *chain of command.* This is the vital artery of the command system. All authority and all responsibility flows through this artery, and through it alone. Cut it anywhere throughout its course only at the peril of seriously interrupting or diverting the normal flow of command authority—the only thing that insures the effective execution of the will of the commander.

As we ascend the steps of the military hierarchy of command, we eventually reach a point where the number of units grouped under a single responsible commander imposes upon him numerous and exacting details. These he cannot possibly have the time and physical endurance to attend to in person if, at the same time, he is to give his attention to the broader phases of his duties. Therefore, at this point in the chain of command, the commander must be provided with staff assistants to relieve him of the burden of details connected with the issuance and distribution of orders, the evaluation of information, and the supply and movement of his troops.

We believe that this point is first reached in the battalion. Here, then, is the lowest echelon in which the commander must have staff assistants. Staffs are not a recent introduction into the military system, nor does the role the staff plays alter in any way the basic principles of command responsibility. *Staffs are no part of the*

chain of command. The commander retains as full responsibility and exacts as complete responsibility from his subordinate commanders as though these assistants—the staff—never existed.

From the above, it can be seen that command, responsibility, and organization are interdependent. Not only must this be clearly understood by prospective commanders, but it must be understood by prospective staff officers. The latter are assistants to the commander, performing in his name such of the details pertaining to the commander's functions as he may delegate to them. In the performance of these details they must keep in mind the responsibility of their commander and the means by which their commander holds his subordinate commanders to their responsibilities. The line of authority and responsibility passes direct from superior commander to subordinate commander. It does not pass through the staff nor can the staff with impunity assume any of the authority or responsibility pertaining to the chain of command.

Staffs, in some form or other, are as old as command and may be said to go back to the period when armed hordes were first grouped into definite military organizations. Commanders have always employed assistants: first as couriers to deliver oral orders; later as military secretaries, with the primary duty of reducing the commanders' orders to writing; and still later as assistants in the performance of administrative and tactical duties.

There is nothing to be gained by attempting to trace the historical origin and development of the staff as an institution in military organization. It is sufficient to say that when armies were small, commanders with a few assistants could work out the details of plans and orders. Fighting formations, and questions of supply were comparatively simple. Battlefields were restricted and troops usually fought under the eye of the commander. As armies became larger and more complex, a commander was compelled to shift more and more of the

burden of administrative detail on the shoulders of assistants in order to conserve his own time and energy for the maneuvering of fighting units. Thus was developed what may be termed the *special staff*,—such as adjutants, quartermasters, and so forth. As weapons improved and fighting formations became more dependent upon specific tactical situations and less on fixed geometric tactical formations, commanders found the need of a new type of assistant—one who could take over some of the burden of tactical detail. Thus was developed the staff group that may be called the *tactical staff* or in large units the *general staff*. The *unit staff* of our modern battalion, regiment, or brigade is an outgrowth of this evolution. In it are combined some of the functions of both the tactical and the administrative staff.

It has been previously stated that after a command reaches a certain size it is impossible for the commander to perform, personally, all the duties which devolve upon him, and that it is necessary to delegate or assign certain of these duties to his assistants. In considering what duties will be delegated to these assistants we must divide the functions of the commander into two general classes. The first class embraces those duties which are inherent in the person of the commander and which either cannot, or should not, be delegated. Let us call such duties *command duties*. The second class of duties are those which the commander finds it possible to delegate to his assistants. These may be referred to as *staff duties*. In general, they consist in handling details in conformity with the plan or policy of the commander which has previously been announced. These so-called staff duties may be functionally classified into: (1) personnel, (2) military intelligence, (3) operations and training, and (4) supply. This functional classification of staff duties has come to be recognized as the underlying principle of all staff organization, from the battalion to the general headquarters.

This grouping must not be construed as implying that staff details can be neatly classified as pertaining exclusively to one, and only one group. It is not as easy as that. Seldom, if ever, will a question come up that will not in some vital way affect all staff groups. Battles are fought with personnel and, therefore, personnel affects tactics. Tactical plans affect supply and supply, in its turn, affects tactics. Moreover, both have a marked effect on personnel matters. Enemy information is vital to proper tactical plans. As a consequence it is common for one item to need the consideration of several staff sections before a sound decision can be reached. Thus all things interlock to make a battle pattern. From all this it is easy to see that there can be *no water-tight staff compartments* into which we may dump these various details of operations. Furthermore, since staff sections interlock and overlap, it is apparent that a coordinating head must be provided to effectively insure that the many related questions that are delegated to the staff are properly handled. This coordination could, of course, be effected by the commander. But that would, in itself, defeat the very purpose of a staff—that of freeing the commander of the burden of detail, in order that he may have the time and opportunity of discharging his broader functions of command. The commander, therefore, obviously needs one principal assistant, to act as his chief advisor. A person who can represent him when he is absent, and who, while coordinating the overlapping staff functions referred to above, also insures that staff and subordinate commanders function in accordance with the orders of the commander.

From the foregoing we see that the command functions that are ordinarily delegated to assistants and known as staff duties may be classified into four functional groups and one coordinating group. This functional classification of staff duties and the necessity for a coordinating head

is recognized in the organization of the unit staff of our battalions, regiments, and brigades.*

It is not enough to learn the written principles of staff procedure—anyone who reads can do that. The staff is not a machine, neither is the commander nor the troops, both of whom the staff must serve. All are human beings —commander, staff and troops. Only by recognizing this fact can staff officers acquire sufficient background for the application of the principles and practice of staff operation. Only with this knowledge, ever present in the background, can the staff be a help to the commander and the troops. Without it they become an instrument of discord and meddlesome interference, causing disorganization, distrust, and lowered morale.

It may be asked, "Just what are the relations of the staff to the commander?" The cardinal principle that governs all activity of the staff officer is: The staff neither commands nor executes, for it has no element subordinate to its authority. It only assists the commander in preparing, transmitting and following up *his* orders and in so doing *recognizes no authority save that of the commander.*

Good commanders usually resent any usurpation of their authority, especially by staff officers. The staff officer who attempts it will quickly find that he has forfeited the confidence of his commander and that his usefulness as a staff officer is at an end. Even the appearance of usurpation must be studiously avoided. The phases: "I desire—", "I direct—" or even "we wish" must never be used. It should be: "The colonel directs —", "The general desires—" or the like.

No two commanders follow the same methods of command. If you would assist the commander you must know his methods. If you would know his methods you

* The physical organization and functioning of the infantry staff may readily be obtained in Chapter 1, Part One, Staff Officers' Field Manual.

must know the man. Therefore, the staff officer must endeavor to learn the commander's personal characteristics, so that he can adjust himself and his actions to them. This will require a close study of the commander's way of doing business, to ascertain his peculiarities and his idiosyncrasies—if any. This is done, not with the idea of *reforming* the commander, but with the idea of *doing business his way.* For instance, some commanders require a mass of detailed data concerning problems presented them for decision, while others require only the essential facts. The rule is to find out what the commander wants, and the way he wants it; then give it to him exactly that way. This subordination to the commander's method of working in no way implies that the staff officer is to become a "yes man". Quite the contrary, the staff officer must have well defined ideas and thoughts and the personal courage and integrity to present them, when requested, irrespective of the known opinion of the questioner. The lack of this quality is a serious defect in any staff officer.

The staff must keep the commander informed on all important matters affecting the command. Nothing embarrasses a commander more than to discover from an outside source that something has been going on in his organization for some time and his staff has failed to inform him of it. Questions of this nature are a real test of the judgment and common sense of the staff officer.

Yet where shall he draw the line? Is the subject one the commander must be informed of at once, even though the staff officer is unprepared to present him with the essential facts bearing on it? Is the subject one which he may withhold from the commander until such time as he is able to gather the essential facts and is prepared to make a definite recommendation? Is it a matter that may be classified as an unimportant detail that need not be presented to the commander? The answer cannot be found by the use of any rule or formula. Good judgment and common sense will usually lead to the right answer.

If there is any rule that is applicable, it is this: resolve every reasonable doubt in favor of informing the commander.

This brings us to the question of how matters should be offered to a commander for decision. This, of course, will depend on the staff officer knowing the manner in which the commander wants his problems presented. Usually a commander wants facts. Whenever possible, the staff officer must marshal all the facts bearing on the subject. He should analyze these facts and their bearing on the problem at hand. He must either arrange all these facts in a logical manner in writing or be perpared to present them orally. The arrangement and consideration of these facts should enable him to arrive at a conclusion. This he should give to the commander in the form of a definite recommendation. If time permits, the papers required to put this recommendation into effect—if approved by the commander—should be prepared and submitted with the recommendation. This saves time, for as soon as the commander indicates his approval the matter is ready for signature and quick dispatch.

Should the commander fail to approve the recommendation, or modify it in any way, then the staff officer must cheerfully accept the change and proceed to carry out the commander's wishes with the same energy as though his original recommendation had been approved in full.

Before we leave the relations of the staff to the commander, it is desired to refer to two personal matters that are very important. *First*: In his position as advisor to the commander the staff officer must remember that his opinion as to the ability of other officers may carry considerable weight, therefore petty personal differences must be put aside. *Second*: The staff should beware of gossip and avoid gossipers as it would a pestilence. The staff officer who indulges in or even listens to gossip is a menace to the harmony of a com-

mand, for inevitably such practices lead to discord and distrust. The staff officer who permits gossip to color his reports to his commander or who gossips about his commander, immediately impairs his value to that officer.

There is no place on a staff for the officer who by nature or habit is temperamentally antagonistic toward those about him, or who gives this impression. Staff duties frequently overlap. Conflicts arise which must be adjusted in the interest of the command as a whole. This calls for the exercise of tact, forbearance, and unselfish self-effacement by all, if the staff is to be an effective, helpful team. Friendship and loyalty within the staff play an important part in team work and should be fostered. The physically close and mentally intimate association resulting from personal conference greatly facilitates coordination. For this reason staff coordination is best effected by direct relations between officers of the different sections. In this way ideas are crystallized and plans adjusted in a minimum time before commencing the solution of a given problem, or the drawing up of an order. This system gives free scope to the staff officer's initiative. Written memoranda and so-called "buck slips" delay action.

Memoranda between staff officers should be needed only to supplement personal contact methods. This applies particularly to infantry staffs which are relatively small. Too great a use of this system between staff sections indicates either indolence or a lack of confidence in associates, shown by the desire to get an associate committed in writing. An example of the results produced by written memoranda may be quoted, since it is rather typical of what may be expected from the system.

A civic body of a certain city where one of our Regular Army regiments is stationed called on the commanding officer and requested a military parade for the delegates to a convention then in session. The commanding officer agreed and set a date of three days later. He sent for S-3 and directed him to make the necessary arrangements

for a parade of the entire regiment, including the trains.

This headquarters was well organized. It had its own Message Center. Although S-3 could confer with S-4 by walking across the hall, he sent him a note, written on an office form, called a "buck slip". The efficient Message Center functioned well enough to deliver the buck slip to S-4 the next afternoon at 2:00 o'clock. Unfortunately, that very morning, S-4, acting on the authority given him by the commanding officer—prior to the conference with the committee of civilians—had stripped the wagons of his train for painting. In fact, painting had already begun. We can picture the commander's state of mind when he found out that his plan could not be carried out in full because of a failure in staff cooperation?

Another case: S-3, as everyone knows, is charged with planning troop movements. When this involves marching, S-3's plan also includes the time and place of the bivouacs. S-1 is charged with the supervision of quartering and sheltering arrangements. A simple requirement in elementary coordination, surely, but let us see how it worked out in one case. The situation is not uncommon.

A regiment was on a practice march several years ago. When the troops arrived at the bivouac area they were halted with packs on, and kept waiting while S-3 lined up stakes that marked the areas of the units. The companies then started to pitch their tents. S-3 ran up and down the line, moving this tent and then that. S-1, who thought he had a function to perform, had some different ideas. He stepped in and proceeded to make changes. Both ignored the battalion and company commanders. Several hours elapsed before the companies could settle down and rest. The result was growling and grumbling that lasted well into the night and seriously affected the comfort of the troops. Fortunately, the regiment got another S-3 before taking the field the next year.

This new S-3 not only knew his business, but he knew what was not his business. He prepared the plan for the

march, the location of the halts and bivouacs. He turned the S-3 bivouac plan over to S-1, the billeting officer. S-1 went ahead, reconnoitered the bivouac area, and had guides meet the units as they arrived. These guides led the units to their assigned areas. Camp was made under the supervision of the company and battalion commanders and in a few minutes the tired troops were under tents and at rest. It is significant to note that this regiment was rated *unsatisfactory* at its tactical inspection for the first year mentioned, but for the second year it was rated *satisfactory*.

It has been stated previously that the line of authority and responsibility passes direct from the commander to the subordinate commanders. Not only must the staff officer remember that he is not in this line of authority or responsibility, but he must also remember that the subordinate commanders are usually his senior in rank. He must, therefore, be careful to accord all officers the courtesy and consideration due them, even while disagreeing with their ideas. Above all, he must remember it is a command principle that all orders and instructions from a higher unit to a subordinate unit are given to the commander thereof. As a consequence, each subordinate commander is accustomed to look to his immediate superior for orders and instructions. Staff officers acting or speaking in the name of the commander must be sure that the commander has authorized such action.

In those urgent circumstances—which fortunately are not common—where it may be necessary to indicate action without specific authority of the commander, the staff officer must be sure that the orders he gives in the name of the commander are the orders that the commander would give if he were present and acquainted with the facts. To be able to do this the staff officer, as indicated before, must be thoroughly familiar with the policies of his commander and his method of operation. When a staff officer acts without specific authority he must, at the first opportunity, advise the commander of

the action he has taken. For nothing will bring about strained relations between the staff and subordinate commanders quicker than staff usurpation of authority, or the bare suspicion of such a condition.

Cordial, cooperative relations between the staff and subordinate commanders will go far toward securing efficiency in the execution of the commander's will. Therefore, it is a staff responsibility to cultivate this relationship. Such a relationship will bear fruit during the anticipation and preparation phase of a plan when information or suggestions from subordinates may be illuminating. This one thing the staff officer must constantly bear in mind—no man has so firm a grasp on his business as to warrant deafness to the opinions of others, particularly when these others are closer to fundamental items that cannot be ignored.

For instance: the subordinate commanders usually have a better understanding of the powers and limitations of their units than has the staff. Therefore, they should be consulted freely and frankly. Commanders' plans have failed many times, because some subordinate commander, not with sinister intent but because of a feeling that information was unwelcome, has held back data which should have been communicated. Even after the commander's orders have been issued the staff will find that, if a frank, helpful relationship with subordinate commanders exists, there are many difficulties of execution that can be ironed out, and many misunderstandings avoided. To sum all this up we can say: the staff officer must get along with subordinate commanders, and it is up to the staff officer to do most of the *getting*!

The organ of execution is the troops. If the staff officer is to be a helpful assistant to his commander he must know the troops. If he is to further the execution of his commander's orders he must be helpful to the troops. He can do neither unless he is familiar with the capabilities, limitations, and the conditions actually confronting the troops. First-hand knowledge of such factors

is gained by personal visits to the troops and not by sitting at a desk shuffling papers. The staff officer must organize his office so that it can function during his absence. He must not hesitate to leave the office to obtain the intimate knowledge of actual conditions which confront the troops. This is a duty that he owes to the commander and to the troops. He must bear in mind that efficient execution by the troops is, in the final summing up, the thing that will make his commander a success or a failure. The motto for staff officers should be: *He serves his commander best who helps the troops most.*

It appears obvious, then, that the staff officer must have first-hand knowledge of the needs, the conditions, and the situation of the lower echelons; but at the same time he must remember that this knowledge should be obtained without meddling with the responsibilities of the hierarchy of command. To be sure, a commander cannot be everywhere and his staff must be his eyes, but these staff eyes must function wisely and according to a careful system. The visiting staff officer must bear in mind that the needs of the troops are those approved by the successive echelons of command, the respect for which lies at the base of all military efficiency. Therefore, he must be punctilious in his observance of proper military customs and courtesy. For example: he must never visit troops without reporting to intervening commanders—first, on arriving, the object of his visit; second, on leaving, what he has seen and intends to report.

This method, while respecting the basic laws of courtesy, gives the staff officer an opportunity to adjust his personal observation to the viewpoints of the successive commanders. Also they will frequently give the staff officer information unknown or unavailable in the lower echelons. Thus his report to his commander will be well rounded and of real value. If he keeps in mind that the purpose of his visit is to find out how he can help the troops and if his subsequent report, or subsequent action,

has been directed toward furthering the needs of the troops, his visits always will be welcome and fruitful.

If, in his preceding visits, he has ascertained the needs of the troops and carried this information to the commander or to the agency that can supply these needs, and afterwards has followed up to ascertain whether the needs are being supplied; then, and only then, will he be doing a real staff job. Moreover, in all his future visits, he will be received with frankness by the troops, be looked upon as a friend, and finally will come to be regarded as the troop representative with the commander. That should be his goal.

Even a staff officer of mediocre prefessional ability can become a pillar of strength to a command if he is able to establish such a relationship. If, on the other hand, a staff officer, no matter how brilliant, fails to interest himself in the needs of the troops or if, with the mantle of the commander on his shoulders, he play the role of critic only, the troops will heartily dislike him and resent his visits. He will be a depressing influence. He will be a source of more harm than good. He will be a failure, personally and to his commander.

Two contrasting examples will serve to illuminate this matter in a hard, white light. During the war a two-company battalion in Siberia was stationed about 150 miles from its regiment. The troops had been engaged in rather trying operations for over six months. The equipment of the men—for which no replacement had been available—was worn and frayed.

Early one morning the regimental supply officer arrived and reported to the battalion commander that he had been directed by the regimental commander to make an inspection of the command. He said his principal interest was to see the condition of equipment and to find out if there was any way the regimental supply office could be of assistance to the troops. He did not desire the troops turned out, he declared, but would ac-

company the battalion commander about and observe the troops as they were.

In his tour he noticed the worn, frayed state of the men's equipment and told the battalion commander that he would replace it at once as he had just received a shipment of new equipment. He said that his office would prepare the necessary papers for the transaction and forward them with the new equipment, since he knew the company commanders had no facilities to do this work. He listened to the battalion commander's story about the difficulties of getting fresh beef and told him he would find some way of getting it to the troops regularly. *And he did.*

The battalion commander unburdened himself, and the staff officer returned to regimental headquarters. Then he followed up every request to the entire satisfaction of the troop commander. The result obtained from his visit was a better equipped, a better fed, and a happier outfit. That was real staff work.

Two days after he left another staff officer from the same headquarters arrived. He informed the battalion commander that he had arrived to make an inspection. He desired the troops turned out. He was critical of the equipment that had been worn threadbare by actual field service. He did not offer one helpful suggestion, nor even ask if there was anything that regimental headquarters could do to help the situation or in any way further the interest of the command. The immediate result of his inspection was a bad taste in everyone's mouth. Later came a "skin-letter" from regimental headquarters about the worn equipment which left a worse taste. This "skin-letter" was signed by a staff officer and not by the commander. This is staff work at its worst. Such staff officers are of no use to a commander and are a menace to a command.

The second staff officer never came again. Perhaps, he is still waiting for a cordial invitation from the battalion commander.

In conclusion all that has been said might be put into six commandments for the potential—even technically trained—staff officer. There may be more commandments but the officer who follows these will achieve his own official salvation and enhance his commander's reputation.

THE STAFF OFFICER'S COMMANDMENTS

I. The staff must recognize no authority save that of the commander. His wishes and his interests must be paramount.

II. The staff serves the commander best when it assists the troops most.

III. The staff must jealously guard against any violation of the chain of command.

IV. The staff officer must not be tied to the command post. He must arrange his office so that it can function during his absence.

V. The staff must know the troops. They are the commander's engine of execution where execution is most difficult. The staff officer should get out and see them, help them all he can, but avoid meddling with responsibilities of subordinate commanders, and never assume the role of a critic.

VI. Lastly, all good staff work is characterized by respect for the duties and responsibilities of others, respect for the basic laws of courtesy, and a realization that assistance to commander and to troops is the real mission of the staff.

CHAPTER 6

The Battle in the Bois Chanel

(HISTORICAL MAP PROBLEM)

An historical map problem has some great advantages. It is not a synthetic problem prepared to illustrate a particular tactical doctrine. Thus the student is not likely to think that there is a certain stretching and twisting of incidents to make them fall into a fixed pattern. And, finally, although information may be vague, incomplete or non-existent; units, fragmentary, out of place, or lacking cohesion; and though any absurdity happen, yet there can be no quarrel with the problem, because Mars, himself, the battlemaster, drew it up. It actually happened somewhere and some one, in some way, had the task of solving it.

In the problem that follows the solutions are based on our present tentative organization as taught at The Infantry School. Yet this organization is in a state of flux; tomorrow it may be different from the one now considered. But this need not affect the problem. It should be remembered that battles are not won by a particular type organization but by the application of men and weapons available to meet a particular situation. Any organization is built for the purpose of doing this with celerity. Yet in combat the most perfect organization loses its type formation owing to losses of materiel, men, and leaders. The military student should not become so immersed in organizational forms that he forgets his pro-

blem is the placing of guns and men to accomplish a certain purpose. That is fundamental.

Furthermore, no matter what type or kind of organization is under a leader's command, he should have mental flexibility enough to accommodate his command—whatever its composition—to the problem at hand. The story of the fight in the Bois Chanel indicates how the French commander, using the organization then existing, solved his combat problem. The solutions given, herein, do not state what the French commander should have done with his units, but what we would do in the same situation with our present tentative and experimental organization. In reading, this should be kept in mind in order to avoid confusion.

Again, if we had a third type of organization—and one is now being experimented with—then our solution might be somewhat different. But, on the other hand, the general principles brought out in the discussion, comments, and conclusions will apply to any organization. After all, that organization is best which enables us to carry out these general principles best. And remember, in battle though we may start with complete organizations we will soon be reduced to fighting with remnants and pieced-out organizations.

This problem, in addition to other things, illustrates a point often glossed over or overlooked. It shows a commander in that nerve-trying period when he is waiting for a fight to develop. From whence the main attack will come, how it will come, and when it will come, is to him a great mystery. What shall he do? On one hand, caution whispers to scour the countryside with patrols of all sorts and build a maze of trenches; but he is constrained to go slowly because of his regard for the tired troops, and yet this solicitude may lead to laxity in security or defensive measures. He is between two fires. And at any particular moment in the long trying hours—hours of thinking and second guesses—he is never sure of his measures. Perhaps he has been too lax,

perhaps he has been so exacting that only a tired or scattered unit remains to face the attack when, and if, it comes. In the blaze of battle he has action to buoy him up; it is the long grey period between actions that tries his soul and his professional skill. This point is seldom mentioned in school problems.

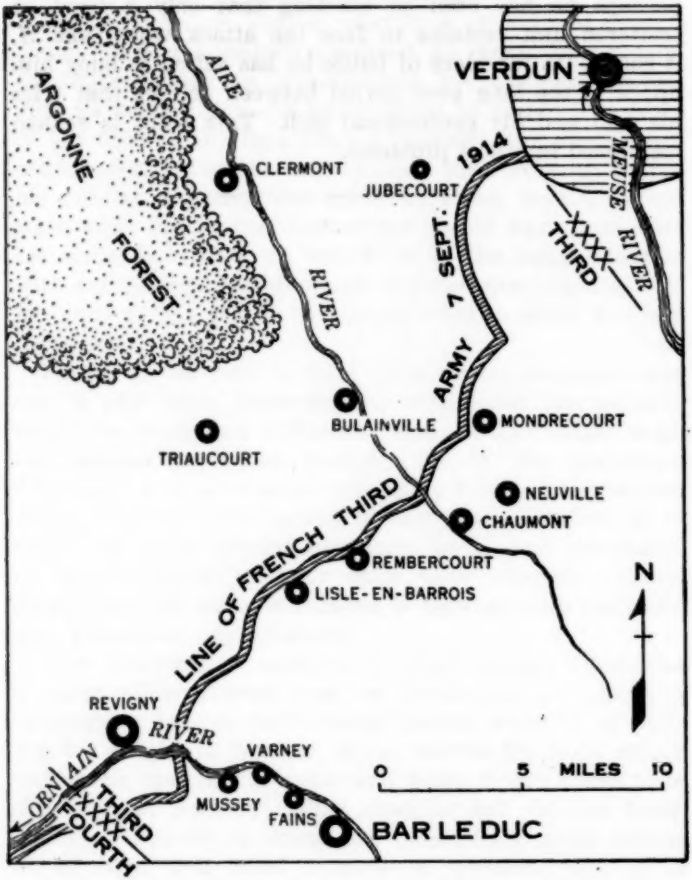

FIGURE 42.—Location of the front of the French Third Army.

THE GENERAL SITUATION

On 22 August, 1914, the French Fourth and Third Armies were defeated in their attempt to traverse the Ardennes Forest, and the following two weeks were spent in a general withdrawal to the south.

On 6 September the French Third Army, commanded by General Sarrail, with its right at Verdun and its left near Revigny was engaged in violent fighting against the German Fifth Army, commanded by the Crown Prince. Neither of the two adversaries gained a marked advantage over the other. (See Figure 42.)

During the fighting on 6 September the French 155th Infantry, 40th Division, participated in an attack by its brigade, the 79th, on the front Amblaincourt—Deuxnouds in the direction of Bulainville. (See Figure 43 in pocket in back of book.) In this action the 1st Battalion suffered heavily.

SPECIAL SITUATION

On the following day, 7 September, the 155th Infantry is ordered in reserve near Courcelles. Late in the afternoon the regimental commander and a number of his officers, among them the commander of the 2d Battalion, are seated in a ditch along the Courcelles—Anglecourt road about 500 yards northwest of Courcelles. (See Figure 43.) The situation as known to these officers is obscure. They know that the Third Army faces to the northwest with the battle line running generally through Mondrecourt—Seraucourt—Vaux Marie, and that the 40th Division, to which they belong, is the right division of the VI Corps of the Third Army. The 65th Reserve Division is on the right of the 40th Division and holds the Bois Chanel, Bois Blandin and Mondrecourt. The exact boundary between divisions is not known. The 12th Division of the VI Corps is on the left of the 40th Division, and its nearest units are west of the Aire River.

The officers of the 155th Infantry find the situation quiet about Courcelles where the regiment is now resting.

While the regimental commander and his officers are availing themselves of their short respite, the following order is delivered to the colonel: "One battalion of the 155th Infantry will go into position in the Bois Chanel."

No additional information is received, and neither the plans nor intentions of the higher commanders are known. However, the colonel immediately directs the 2d Battalion to comply with the message.

ACTION OF 2d BATTALION 155th INFANTRY

The account from which this problem is drawn continues with the following:

"The battalion commander gnashed his teeth against so vague an order. 'What is known of the enemy? Where are the friendly units on the right and the left? What is the exact mission of the battalion?' The colonel, a chief who knew his subordinates and how to handle them, smiled at the major's actions and took the proper course. 'Start your battalion en route immediately and dispatch a mounted officer to obtain more complete information from the division.'"

The 2d Battalion 155th Infantry is resting near the northern edge of Courcelles and can be assembled ready to march in five minutes. It is 6:00 PM and it will be dark at 6:40 PM.

Place yourself in the position of the commander of the 2d Battalion. Remember this is not a map problem. There is no chance to ask for a clarification of the situation, nor will it avail anything to rail at the people who produced such a situation. For this is war and such a situation is a common-place of war. Here, you will have to do a soldier's not a student's job. If too much concentration on map problems, with their synthetic situations and symmetrical solutions, has given you a more

orderly conception of war, here is a chance to rectify your error. What can you do here under war conditions? That is the problem and to simplify it we shall break it down into two parts as given below in the requirement.

FIRST REQUIREMENT

a. Your plan, as battalion commander of the 2d Battalion 155th Infantry, for the movement of the battalion on the Bois Chanel (see Figure 43).

b. Instructions which you, as battalion commander 2d Battalion 155th Infantry, give your S-2 (see Figure 43).

(*NOTE.*—Assume that you have a rifle battalion of three companies organized and equipped in accordance with the tentative organization now being taught at The Infantry School. A rifle company is composed of three platoons of two sections each. Each section has two light machine-guns and the riflemen are armed with semi-automatic rifles.* To this rifle battalion is attached Company H (heavy machine guns, caliber 0.30), 2d Platoon Mortar Company (81-mm), 2d Platoon Regimental Machine-gun Company (four caliber 0.50 antitank guns), and the 2d Battalion Communications Section of Regimental Headquarters Company.

Assume that the battalion intelligence personnel consists of one corporal and two privates (obervers).

Assume also that the regimental commander has offered the use of any additional transportation needed by the battalion for the purpose of transporting reconnaissance patrols.)

* See Chapter 1, Volume XI, The Mailing List. It should be noted that this is one type organization that is being experimented with. It should not be assumed that this is the type which will eventually be adopted.

DISCUSSION OF FIRST REQUIREMENT

The commanding officer 2d Battalion 155th Infantry is here faced with two obvious requirements: to initiate reconnaissance of the Bois Chanel, and to move his battalion forward. The orders received are such that he cannot afford to await the results of reconnaissance before starting his battalion forward. Furthermore, he wants to take maximum advantage of the remaining period of daylight.

All that brings up certain questions. Shall he instruct the executive officer to march the battalion forward while he precedes it to the Bois Chanel on reconnaissance? Shall he order a staff officer to make the reconnaissance while he, himself, conducts the march of the battalion; or shall he provide the advance guard with motorized units and direct the advance guard commander to seize the northern edge of the Bois Chanel with a motorized detachment of the advance guard? The battalion commander probably will be in a better position to meet possible developments if he remains with his battalion and has the advance guard seize the objective of the battalion before dark.

If the advance guard is reinforced by a platoon of heavy machine guns and a section of antitank machine guns, the advance guard commander can carry out the plan of the battalion commander. By reducing the crews of the attached motorized weapons to the minimum, the advance guard commander can easily accommodate one platoon of infantry on the six trucks of these attached weapons. Such a motorized detachment can block the bridges over Bunet Creek north and northwest of the Bois Chanel and seize the northern edge of the woods.

The route of march of this motorized detachment should be selected to enable the detachment to reach its objectives before dark. It should avoid passing through the Bois Chanel, since the woods may be occupied by the enemy and the reduced visibility would slow down the

progress of the detachment and increase the danger of ambush. The detachment might move safely over the unimproved road to the east of the woods, or over the Courcelles—Amblaincourt Road, or be split and each element move over one of the above mentioned roads. Moving the detachment as one force over the unimproved road to the east of the woods probably offers the greatest advantages.

The route of march selected for the foot elements of the battalion should permit them to reach the Bois Chanel promptly. The unimproved road to the east of hill 309 is the longest route and leads to the least critical area of the woods. It, therefore, can be discarded.

The Courcelles—hill 309—Seraucourt Road is the most direct to the Bois Chanel. The advantage of this route is that it leads to the commanding ground marked by hill 309. Possession of this high ground will be of value in case the enemy is encountered en route to the Bois Chanel, and daylight 8 September finds the battalion still south of the objective. The disadvantages of this route are:

(1) Movement over the crest of the ridge before dark can be observed from the northeast and northwest.

(2) The route fails to lead directly to the critical area marked by the bridge over Bunet Creek south of Amblaincourt.

The Courcelles—Anglecourt highway is also a direct route to the Bois Chanel. The advantage of this route is that it leads straight to the critical area indicated above. The disadvantage of this route is that it is commanded by higher ground to both the east and west.

Of the two latter routes, the Courcelles—hill 309—Seraucourt Road probably offers the greatest advantages.

The formation adopted for the march of the foot elements of the battalion should prevent surprise, facilitate control, and enable the battalion commander to dispose quickly his battalion to meet possible developments in the situation. Owing to approaching darkness, the neces-

sity for control rises in importance. The battalion might march in two columns, one on the Courcelles—hill 309—Seraucourt Road, and the other on the Courcelles—Anglecourt Road. A formation in two columns will, in case of contact south of the Bois Chanel, permit quicker deployment of the battalion. Control at night, however, is difficult and direction is not easily maintained. The loss of direction and control, when in contact with the enemy, often leads to confusion and panic even amongst well trained and seasoned troops. A march in one column on either of the two westernmost roads will facilitate control by the battalion commander. If movement is made via the Courcelles—hill 309—Seraucourt Road, the left flank of the battalion must be protected from an enemy approach from the direction of Anglecourt.

The battalion S-2 and his intelligence personnel should accompany the motorized detachment of the advance guard. If S-2 is allotted sufficient transportation, he can place his intelligence observers in the forward positions along the northern edge of the Bois Chanel. Under protection of the advance guard S-2 can make a quick reconnaissance of the Bois Chanel and, while the battalion is still south of the woods, be able to inform the battalion commander of the conditions to be met.

A SOLUTION OF FIRST REQUIREMENT

a. The plan of the battalion commander 2d Battalion 155th Infantry for the movement of his battalion on the Bois Chanel is as follows:

He decides to form the battalion at once and march immediately on the Bois Chanel via the Courcelles—hill 309—Seraucourt Road. Company E, with one platoon Company H and one section Regimental Machine-Gun Company attached, will constitute the advance guard. The advance guard will secure, with a motorized detachment, the north edge of the Bois Chanel, from the unimproved road junction 400 yards south of Seraucourt (inclusive)

to the northwest edge of the woods, and block the bridges over Bunet Creek south of Seraucourt and Amblaincourt.

One platoon of Company F will go, via the Courcelles—Anglecourt Road, to Anglecourt with the mission of covering the roads leading north and west of Anglecourt and protecting the left of the battalion. This platoon will remain in Anglecourt until further orders and send a reconnaissance patrol to the road junction west of the Anglecourt bridge.

The main body in order of march will be formed as follows: Headquarters and Headquarters Detachment 2d Battalion, Company F (less one platoon), Company G, Company H (less one platoon), 2d Platoon Regimental Machine-Gun Company (less one section), and the 2d Platoon Mortar Company. It will follow the advance guard at 800 yards.

Field and combat trains will remain in present locations until further orders.

Messages to the battalion commander will be sent to the head of the main body.

b. The battalion commander explains the situation to S-2 and instructs him to take the 8-passenger reconnaissance truck and the motorcyle with sidecar and such personnel as he may select, and move under the protection of the advance guard to the Bois Chanel. Upon arrival in the Bois Chanel, reconnaissance will be initiated to obtain the following information:

Are units of the 65th Reserve Division or any other friendly units in the Bois Chanel and if so, what are their orders?

Are any enemy troops in the Bois Chanel?

Are there indications of hostile activity along the general line: Rignacourt—Seraucourt—Amblaincourt—Beauzee?

What is the general nature of the Bois Chanel?

He directs S-2 to have a report ready for him at the crossroads on hill 309 by 7:00 PM.

SECOND REQUIREMENT

The plan of S-2 to carry out the instructions given by the battalion commander.

A SOLUTION OF SECOND REQUIREMENT

S-2 plans to take one corporal observer (intelligence), two privates, observers (intelligence), and three privates, (riflemen of Company E), and to accompany the motorized detachment of the advance guard as far as the southeast corner of the Bois Chanel.* In this locality his group will leave the motorized detachment and move into the Bois Chanel via hill 309—Seraucourt Road.

On arrival at the intersection with the east and west trail in the central part of the woods he plans to stop and direct the corporal observer to take the three privates (riflemen) and patrol due west to the edge of the woods. They will report the location of any hostile or friendly troops seen in the woods and the general nature of the woods and trails and rejoin him, not later than 6:45 PM, at the point where the east and west trail leaves the west edge of the woods.

S-2, himself, plans to continue with the two private observers and the motorcycle with sidecar to the north edge of the woods. Here he will leave one private observer and the motorcycle and driver. This observer will

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* While the precise method of selecting and using personnel is given here, this should not lead to a false impression. This battalion has been in action for some time and has losses. S-2, very likely, will have lost some of his trained personnel and will have to improvise means to accomplish his task. However, if he has had no losses, this solution would be a satifactory one. If he has lost certain key men he should endeavor to use the material available to conform, so far as possible, to the method outlined.

study the sector: Rignacourt—Amblaincourt, for indications of hostile activities and make a panoramic sketch of the sector, indicating thereon the location of the important terrain features and any observed hostile activities. After completing this sketch he will remain in observation, while the motorcycle driver returns to the southern edge of the woods with the completed sketch and awaits the arrival of S-2. S-2 plans to continue with the remaining private observer to the northwest edge of the woods. There he will direct the observer to make a panoramic sketch of the sector Seraucourt—Beauzee, indicating the important terrain features and the location of observed hostile activities. While this is going on S-2 plans to observe the locality from this point, and upon completion of the sketch to have the observer remain in observation while he take the sketch and goes to meet the corporal observer and his patrol at the west edge of the woods. Later he will return to the locality where the motorcycle driver awaits him.

His plan then calls for sending at 6:55 PM the corporal observer (by motorcycle) to the battalion commander at the crossroads on hill 309 to deliver a written message and the panoramic sketches. This soldier will be available as a guide for the battalion commander.

SITUATION, CONTINUED (ACTUAL OPERATIONS)

The 2d Battalion is soon on the march, with the 5th Company as the advance guard. The route taken is the Courcelles—Amblaincourt road. One of the officers of the battalion is dispatched to division headquarters to obtain further information.

The battalion passes through Anglecourt, then moves across country into the southern edge of the Bois Chanel (See Figure 43). The woods are dense.

Units of the 311th Infantry 65th Reserve Division are found in the Bois Chanel. The little information obtained

from the officer of this regiment indicates that they expect to withdraw soon from the woods. They are unable to inform the commander of the 2d Battalion 155th Infantry of the location of the colonel, 311th Infantry or his command post.

The officer sent by Major 2d Battalion 155th Infantry to division headquarters has not returned.

It is 7:45 PM. The battalion is now within the woods near the junction of the trail and unimproved road 100 yards southwest of the "S" in Bois Chanel.

THIRD REQUIREMENT

a. So much of the plans of the battalion commander 2d Battalion 155th Infantry at this time as would be contained in paragraph 2 and 3 of a formal field order.

b. Instructions, if any, which the battalion commander gives to S-2.

(*NOTE.*—Assume that your battalion is organized, equipped, and reinforced as indicated previously.)

DISCUSSION OF THIRD REQUIREMENT

There is a great deal to be desired in the way of information in this situation. If the Commanding Officer 311th Infantry can be found he may be able to furnish much of it. An effort must therefore be made to find him. Very little information can be obtained by our patrols at night. However, they should be able to follow the Aire River and the roads leading to Seraucourt and Amblaincourt and thus cover the most critical points in the sector.

However despite the paucity of information and the difficulty of patrolling, there are several plans open to the battalion commander upon the arrival of his battalion in the Bois Chanel. These are:

Plan 1.—To hold the battalion in a central position in the Bois Chanel, with security detachments to the front and flanks while an attempt is made to obtain additional

information on which to base the dispositions of the battalion.

Plan 2.—To deploy a part of the battalion along the northwest edge of the woods to cover the bridge crossing over Bunet Creek south of Amblaincourt and hold the greater part of the battalion at a central point in the woods prepared to move to any threatened area; to protect the flanks of the battalion with security detachments.

Plan 3.—To deploy a part of the battalion along the northwest and north edge of the woods to cover Bunet Creek from the bridge south of Amblaincourt, inclusive, to Seraucourt, inclusive; to hold the remainder of the battalion at a central point in the woods prepared to move to any threatened area; to protect the flanks of the battalion with security detachments.

Plan 4.—To deploy the bulk of the force along the northeast, north and northwest edge of the woods and hold the remainder in a central position in the woods prepared to move to any threatened area; to protect the left flank of the battalion with a security detachment.

Plan 1 has the advantage of keeping the battalion well in hand until the situation in the Bois Chanel is cleared. The disadvantage is that the battalion will not be disposed to meet an enemy attack. Furthermore, no positive action is taken under this plan while waiting for information which may not be received.

Plan 2 has the advantage of covering the crossing over Bunet Creek south of Amblaincourt and at the same time keeping a large part of the battalion in hand while the situation remains obscure. It does not, however, provide sufficient protection against an enemy advance across Bunet Creek between Amblaincourt and Seraucourt. It also overlooks the difficulty which will be encountered in moving troops at night through woods with which they are not familiar.

Plan 3 has the advantage of disposing the battalion at once to meet an enemy advance between Amblaincourt, inclusive, and Seraucourt, inclusive, and at the same time

holds out a reserve for use at any threatened point.

Plan 4 has the advantage of disposing the battalion at once to meet an enemy advance on the Bois Chanel from three directions. The disadvantages are that it disperses the battalion over a wide frontage at night and provides but a small reserve to meet developments in a situation which at this time is obscure.

Both Plans 3 and 4 recognize the difficulties of *movement by night* over strange terrain, by disposing the bulk of the battalion to fight in place

A SOLUTION OF THIRD REQUIREMENT

a. The battalion commander decides to dispose his battalion at once for defense of the Bois Chanel.

Company G, with one section of machine guns attached, will take position along the north edge of the woods astride the road: Courcelles—hill 309—Seraucourt; it will maintain contact with Company F on the left, protect the right flank of the battalion, and report the strength and location of any friendly troops in its area.

Company F, with one section of machine guns attached, will take position along the northwest edge of the woods, from the unimproved road and trail junction 200 yards northwest of the "B" in Bois Chanel to the unimproved road and trail junction 400 yards north of the "O" in Bois Chanel; this company will send two squads west of the woods to cover the Anglecourt—Amblaincourt road and the bridge south of Amblaincourt. It will report the strength and location of any friendly troops in its area.

Company E and Company H (less one platoon), the regimental machine-gun platoon, and the mortar platoon will take position in the woods south of the "N" in Bois Chanel in battalion reserve; company officers will reconnoiter the roads and trails within the Bois Chanel; Company E will send a section to Anglecourt to cover the bridge west of Anglecourt, and at daylight gain

contact with and report the location of any friendly troops on our left.

b. S-2 will be given the following instructions: Each of the two front-line companies will establish a listening post on the south bank of Bunet Creek opposite its sector. The left company will establish two listening posts along the east bank of the Aire between its junction with Bunet Creek and the bridge west of Anglecourt. It will send reconnaissance patrols into Amblaincourt and Seraucourt to remain there until one hour before daylight. An officer motor patrol will be sent to the Bois Landlut and to Rignacourt to locate any friendly units, determine their dispositions, and secure information of the enemy.

SITUATION, CONTINUED (ACTUAL OPERATIONS) NIGHT OF 7/8 SEPTEMBER

In the foregoing the solution has been based on a modern organization. Let us see how one battalion commander in an actual war situation with the units then on hand tried to meet an obscure situation.

First, he decides to hold the line of the northern end of the woods. (See Figures 43 and 44.)

To do this he has four rifle companies, the 5th, 6th, 7th, and 8th, and a section of two machine guns. Each rifle company has four platoons.

He disposes this force as follows:

5th Company: from the northwest corner to the middle of the gap in the northern edge of the wood, both inclusive, covering the road from Amblaincourt.

6th Company: from the right of the 5th Company to the northeast corner of the wood, exclusive.

7th Company: the northeast corner of the wood.

8th Company: dug-in in reserve on a crest immediately south of Bois Chanel.

Battalion command post is with the 8th Company.

The section of machine guns is with the 5th Company. The night passes without incident.

Considerable time is required to get the units into position. There is no enemy activity and nothing to indicate the enemy position or intentions.

The officer sent to division headquarters returns without any precise information and no orders are received

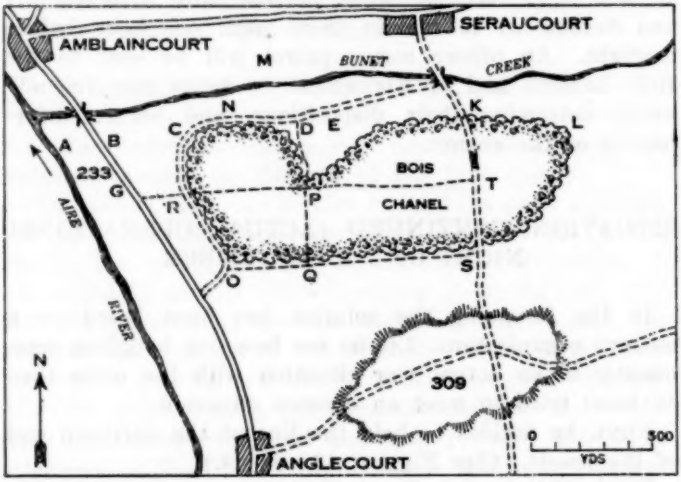

FIGURE 44.—The Bois Chanel and vicinity.

during the night from regiment or brigade. Neither rations, water, nor ammunition are received.

Small units and groups of men of the 311th Infantry remain in the Bois Chanel throughout the night but no new information relative to the situation is obtained from these men.

A short time prior to dawn the battalion commander receives a message signed by a brigade staff officer which includes the operations order of the 40th Division for 8 September. The only information obtained from the mes-

sage and the order is to the effect that the other brigade of the division—the 80th—holds the Bois Landlut, and that the left boundary of the division is the Aire River.

FOURTH REQUIREMENT

a. Actions of the battalion commander beginning at dawn on 8 September.

b. What instructions, if any, does he issue to his S-2?

(NOTE.—Assume that the dispositions as outlined in the Solution of the Third Requirement are in effect at this time.)

DISCUSSION OF FOURTH REQUIREMENT

The battalion commander by daylight on the 8th has received some additional information relative to the disposition of friendly units in the vicinity of the Bois Chanel. He has not, however, received any definite information of the enemy or friendly units on his right and left. Daylight will give him an opportunity to reconnoiter the terrain in and near the Bois Chanel, inspect dispositions of his battalion, and order such changes as his reconnaissance indicates should be made. The command posts of any friendly units in the Bois Chanel can also be located, and some information may be obtained from this source.

Instructions for any patrols that are to operate during hours of darkness should be issued early enough to enable the patrols to familiarize themselves with the terrain during daylight hours. In daylight, the entire sector and the adjacent flanks must be kept under continual observation. Day reconnaissances should be made of critical terrain features in the vicinity of the Bois Chanel. The battalion commander should give S-2 the essential elements of enemy information he desires.

In this case the situation has been quiet for the past 36 hours. It is therefore essential that he gain contact

with the enemy and learn something of his disposition and probable intentions.

A SOLUTION OF FOURTH REQUIREMENT

a. At dawn on 8 September the battalion commander 2d Battalion, accompanied by S-3, the commanders of Company E, Company H (caliber 0.30 Machine-gun Company), Regimental Machine-gun Platoon (caliber 0.50), and Mortar Platoon, visits the two rifle companies defending the northwest and north edge of the woods reconnoitering the terrain en route. He instructs the company commanders of the two companies in position to withdraw their respective companies into the woods for cover during daylight hours. He then inspects the dispositions of the companies and orders such changes as he finds necessary. He discusses with the commanders of Company H, Regimental Machine-gun Platoon (caliber 0.50), and Mortar Platoon during the reconnaissance, the use of their respective units for support of the defense and directs them to reconnoiter for positions for their elements from which they can best give this support.

b. He instructs S-2 to establish three observation posts: Company G to cover the sector Bois Blandin—Deuxnouds; Company F to cover the sector Seraucourt—Beauzee; and a battalion observation post to cover the sector Beauzee—Vaux Marie (all points inclusive).

The battalion commander then directs S-2 to make arrangements for night patrols to cover the south bank of Bunet Creek and the east bank of the Aire River, and to establish strong listening posts in Seraucourt, Amblaincourt, and at junction of Bunet Creek and the Aire River during hours of darkness.

He further orders that reconnaissance be made of Seraucourt, Amblaincourt, Bunet Creek and the Aire River before noon today to determine their general character and any indications of enemy or friendly troops.

Finally he furnishes S-2 with the following essential

elements of enemy information which must be obtained:

(1) What are the dispositions and actions of the enemy west of the Aire River?

(2) Are there any enemy north of Bunet Creek and, if so, what are their dispositions?

(3) What are the locations, types, and actions of any enemy artillery north or west of Bois Chanel?

(4) What is the nature of enemy reconnaissances and action of their patrols?

SITUATION, CONTINUED (ACTUAL OPERATIONS) DAYLIGHT 8 SEPTEMBER

At dawn the 8th Company is shelled by a German battery located in the area: Bulainville—Bois Renonlieu. The company is moved down the slope into the Bois Chanel.

A few minutes later the battalion commander on reconnaissance near the northern edge of the woods, finds the colonel of the 311th Infantry. These two officers are forced by enemy shell fire to seek cover within the wood. The battalion commander learns that the colonel is collecting his regiment and evacuating the wood. Soon the units of the 2d Battalion 155th Infantry are the sole occupants of the Bois Chanel.

The northern edge of the woods being under the observation of the Germans, the 5th and 6th Companies move back into the woods and take cover during the day, for when any of the French expose themselves, they immediately draw the fire of enemy artillery. The 7th Company leaves only a small outguard at the northeast corner and withdraws to a position in rear of the 6th Company.

The battalion commander's orders for the daylight defense are that the main line of resistance held by the 5th and 6th Companies shall be the northern edge of the woods and that the reserve of the battalion (the 7th and 8th Companies) be kept mobile so that it can reinforce

any part of the line occupied by the 5th and 6th Companies, which may be attacked.

As the day wears on the battalion commander learns more about the situation. He finds out that the units on the left of the 2d Battalion 155th Infantry are chasseur battalions attached to the French 12th Division. These battalions are facing to the northwest and holding the line through Vaux Marie Farm. The gap between Bois Chanel and the chasseurs who are west of the Aire, is covered by a single rifle platoon from the 1st Battalion 155th Infantry posted at the Anglecourt bridge.

He learns also that units of the French 65th Reserve Division hold Seraucourt and the Bois Blandin on the right of the 2d Battalion 155th Infantry. It is apparent that his is the only battalion of the 40th Division in the front line. The main line of resistance of the division battle position extends from the Bois Landlut to Courcelles, both inclusive. The 80th Brigade is on the right and the 79th Brigade is on the left.

During this same day the battalion commander learns that General Joffre has halted the retreat of the French armies and passed to the offensive. He receives a copy of the general order which Joffre issued on this occasion. It follows:

"At the moment when the battle upon which hangs the fate of the country is about to begin, all must remember that the time for looking back is past; every effort must be concentrated on attacking and throwing the enemy back.

"Troops which can no longer advance must at any cost keep the ground that has been won, and must die where they stand rather than give way.

"Under present conditions no weakness can be tolerated.

J. Joffre."

Actually—and this is a commonplace of combat—the commander of the 2d Battalion 155th Infantry knows very little of the great Battle of the Marne which is raging at this time. He knows only his own position in the battle

line, the location of the units on his flanks and in the rear; and that his mission is to hold the Bois Chanel. In this he is fortunate; often commanders know far less.

As for the enemy, the battalion commander knows that the Germans have forced the French line back to its present position and although across Bunet Creek and for the time being inactive, they may resume the attack at any time. He knows that this creek in his front is fordable everywhere but with difficulty and that the bridge at Amblaincourt is still intact. The clearing in the northern edge of Bois Chanel is a recent one and in it are a number of long piles of cordwood.

German artillery fire continues to fall in the Bois Chanel throughout the day but losses are kept down by remaining under cover. The enemy fire has prevented rations and water being brought into the woods. The companies have one day's supply of ammunition but the supply of water and rations is exhausted.

As the afternoon passes without further incident the battalion commander gives thought to the changes he should make in his dispositions on the basis of the new information. It is now 4:00 PM.

FIFTH REQUIREMENT

The changes, if any, which the battalion commander 2d Battalion will make in his plan of defense at this time.

(*NOTE.*—Assume that the dispositions as outlined in Solution of the Third Requirement are in effect at this time. Do not confuse and use the actual situation with that given in the Solution.)

A DISCUSSION OF FIFTH REQUIREMENT

The 2d Battalion is now the only French unit in the Bois Chanel. The mission of the battalion is unchanged. The battalion commander has received definite information that friendly units on his right hold Seraucourt and the

Bois Blandin; that the nearest friendly unit on his left is the rifle platoon from the 1st Battalion 155th Infantry at the Anglecourt bridge. This platoon is covering the gap between the Bois Chanel and friendly troops west of the Aire. It is evident now that the 2d Battalion is acting as an outpost for the 40th Division which is holding a main line of resistance along the general line Bois Landlut—Courcelles, both inclusive.

It is also evident that the line of resistance for the 2d Battalion faces generally northwest and extends from Seraucourt, exclusive, to the bridge over the Aire River west of Anglecourt, exclusive. The battalion must therefore be redisposed at once to defend this general line. The width of the sector and the battalion's mission, as now definitely determined, do not justify the retention of a strong reserve.

The most critical area in front of the 2d Battalion sector is the angle formed by the junction of the Aire River and Bunet Creek. This small area which contains the bridge over Bunet Creek and the Amblaincourt—Courcelles highway offers the best route for an enemy advance, particularly at night, *because of its well defined direction lines.* The defense should therefore be strongest here. A small reserve should be held in a central position from which it can be moved quickly to any threatened part of the sector, although too much reliance must not be placed on the ability to employ a mobile reserve at night. Machine guns and mortars must be so located that they can bring effective fire in support of the battalion. Consideration must also be given to differences in day and night dispositions of the battalion.

A SOLUTION OF FIFTH REQUIREMENT

Company G, with one section of machine guns attached, will organize and defend the Bois Chanel in the right company sector; and coordinate its defense with Company F on the left. During hours of darkness it will maintain

contact with friendly units in Seraucourt and maintain listening posts and patrols along the south bank of Bunet Creek within its sector (See Figure 45).

Company F, with one section of machine guns attached, will organize and defend the Bois Chanel in the center company sector and during hours of darkness have two rifle squads stationed in positions west of the woods from which they can cover the bridge over Bunet Creek and the highway leading south therefrom; it will maintain, during the hours of darkness, listening posts and patrols along the south bank of Bunet Creek and the east bank of the Aire River within the Company sector.

Company E (less one platoon) will defend the left company sector and organize for defense that part of the Bois Chanel within its sector. It will coordinate its defense of the Bois Chanel with Company F on the right and have its section at Anglecourt maintain contact with the platoon of the 1st Battalion 155th Infantry at the bridge in order to cover the entrances to Anglecourt from the west and south. Company E will maintain, during darkness, listening posts and patrols along the east bank of the Aire within the company sector.

One platoon of Company E will take position south of the "N" in Bois Chanel as Battalion reserve, this platoon to be prepared to move to any part of the sector in case of enemy attack.

Company H (less one platoon) will take position south of the "N" in Bois Chanel; during daylight hours the one platoon remaining with this company will be prepared to occupy previously selected positions within the sector in support of the battalion. At night this platoon will place its guns on the nose about 400 yards northeast of Anglecourt, with one section sited to cover the Anglecourt—Amblaincourt road in the direction of Amblaincourt, and one section sited to fire in the general direction of Anglecourt.

The mortar platoon will be emplaced in the Bois Chanel prepared to fire along the banks of the Aire River and

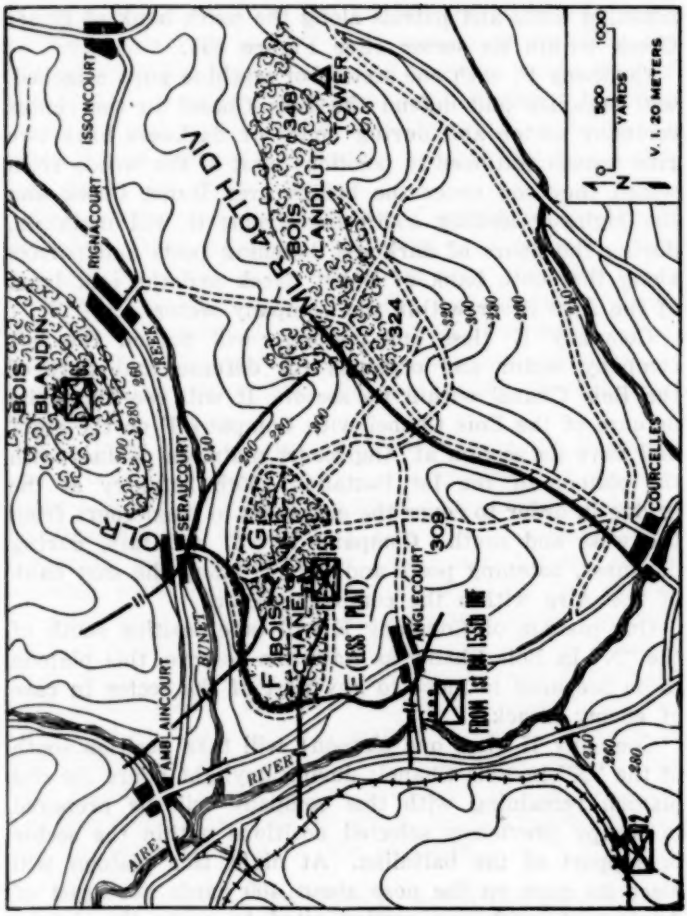

FIGURE 45.—Organization of the Bois Chanel.

Bunet Creek. The mortars will be sited initially to fire along these streams in the sector of Company F.

The 2d Platoon, Regimental Machine-Gun Company, will locate the antitank (caliber 0.50) machine guns, as follows: one gun near the edge of the woods in the area of Company G, to cover the bridge at Seraucourt; one gun in the area of Company F, covering the bridge south of Amblaincourt; one gun on the nose south of the Bois Chanel in the area of Company E, covering the bridge west of Anglecourt, and also the bridge south of Amblaincourt. The remaining gun will stay with the battalion reserve, after preparing two positions—one in the area of Company G, and another in rear of Company E—to be occupied promptly in the event of a mechanized threat against either flank of the battalion.

SITUATION, CONTINUED (ACTUAL OPERATIONS) NIGHT OF 8/9 SEPTEMBER AND DAYLIGHT HOURS OF 9 SEPTEMBER

The battalion commander moves the 8th Company out of the woods to the line A-B-C. (See Figure 44.) The 5th and 6th Companies move forward into the trenches they dug the night before on the northern edge of the woods. The 7th Company is held in reserve in the middle of the woods. The section of machine guns with the 5th Company covers the Amblaincourt crossing.

The night of 8/9 September passes without incident other than that supplies of food and water do not arrive. The morning of 9 September likewise passes with the battalion again occupying its day positions. Throughout this time communication with the rear is entirely by runner.

During the afternoon of 9 September the following developments occur:

German artillery of heavier caliber bombards the entire French line. Many shells fall in the Bois Chanel.

About 5:30 PM a patrol from the 5th Company enters

Amblaincourt and runs abruptly into a German patrol of two officers and a squad of men. The German patrol withdraws in haste and the French patrol captures the horses which the two German officers have ridden into the village. Investigation of the saddle equipment discloses that one of the German officers is an engineer.

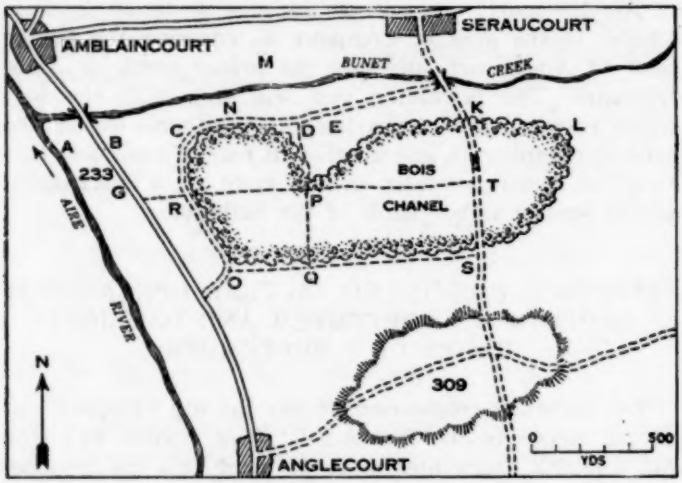

FIGURE 44.—Bois Chanel and vicinity.

Later in the day the battalion cooperates with neighboring units of the 65th Reserve Division in preventing a number of enemy patrols from working around and into the eastern edge of the Bois Chanel. The battalion commander witnesses this action.

SIXTH REQUIREMENT

A brief estimate of the enemy situation as of dark 9 September as prepared and disseminated by S-2.

(*NOTE.*—Assume that your battalion (reinforced) is organized and equipped in accordance with the experimental tables of organization as indicated previously.)

A SOLUTION OF SIXTH REQUIREMENT

S-2 prepares the following estimate which, after approval by the battalion commander, will be sent by written message to organization commanders and communicated to the staff:

Situation—quiet, night of 8/9 September.

Enemy reconnaissances reported in Amblaincourt and between Bois Blandin and Bois Chanel. German reconnaissance patrol led by an engineer officer indentified in Amblaincourt. Heavy artillery fire has fallen on Bois Chanel during the day of 9 September.

The enemy can:

(1) Defend north of Bunet Creek and the Aire River.

(2) Launch a general attack at daylight tomorrow from positions north of Bunet Creek and west of the Aire River.

(3) Attack tonight to seize the Bois Chanel preparatory to a general attack at daylight.

(4) Make raids on our position tonight in order to learn our dispositions.

My conclusions are that increased artillery fire, enemy reconnaissances, and the presence in Amblaincourt of a patrol led by an engineer officer indicate preparations for crossing Bunet Creek and the Aire River and that some form of attack may be expected within the next 24 hours.

SITUATION, CONTINUED (ACTUAL OPERATIONS) NIGHT OF 9/10 SEPTEMBER

The battalion commander shares the conviction of his officers that the enemy is going to attack during the night. He sends a warning message to his regimental commander.

Just before dark a heavy bombardment falls in the area Seraucourt—Bois Blandin. Then all is quiet.

At dark the battalion occupies the positions held during

the preceding night except that only one platoon of the 6th Company occupies the company position on the northern edge of the wood. The remainder of the company (3 platoons) is in reserve near point T. Security groups are stationed on Bunet Creek. Two squads from the 8th Company are posted in Amblaincourt (See Figure 44).

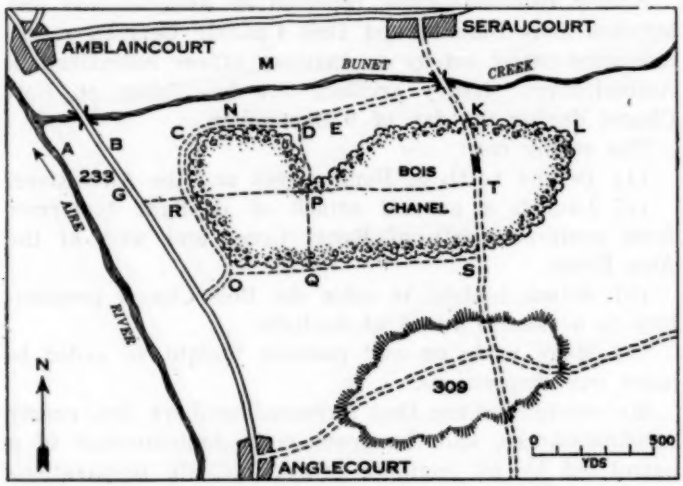

FIGURE 44.—Bois Chanel and vicinity.

About 11:30 PM it begins to rain. The men, still without rations and drinking water, and soaked to the skin, are anxiously awaiting the German attack.

Shortly afterwards around midnight, two large fires break out in the village of Amblaincourt. Soon a violent fusillade of small arms fire can be heard in the direction of Amblaincourt. The battalion commander, who is with the 7th Company, leads it forward via the path Q-P to the trail crossing P. (See Figure 44). From this vicinity he can see the ground north of Bunet Creek which is illuminated by the fires burning in Amblaincourt. He

goes forward to the 5th Company and finds it engaged in a fire fight with a force of Germans, apparently a company, at point M. The men of the 5th Company are firing madly. The Germans across Bunet Creek are firing at random into the shadows of the Bois Chanel. The two machine guns with the 5th Company are firing toward Amblaincourt. The flames of Amblaincourt also enable the battalion commander to see another German unit, probably a platoon, under cover of a fold in the ground at N engaged in a mad fire fight with the 5th Company.

The situation seeming less critical on the right of the battalion, the battalion commander orders the 6th Company (less the platoon posted at the edge of the woods), to move to point P.

He then returns to the command post of the 5th Company and tells the company commander to have his men fire more slowly, otherwise they will soon be out of ammunition.

ATTACK ON THE 8TH COMPANY

The battalion commander soon goes via the path P-R to the command post of the 8th Company where he locates the company commander. The captain reports that he has been forced to withdraw his left from the line B-A to the line B-G, also that ammunition is running low. The battalion commander, anxious to find out more about the situation between the Bois Chanel and the Aire River, continues on to point G which is now the center of the front line of the 8th Company. Here he finds the road illuminated by the flames of Amblaincourt. He sees numbers of German dead and wounded on the highway. He sees one of the platoons of the 8th Company withdrawing south toward Anglecourt. This platoon, which has already withdrawn past point G, is firing against Germans who are following up the platoon's withdrawal. He sees a German force which he estimates to be a company with three platoons in line, launch an attack against line B-G

from the west. Opposing this attack is the greater part of two of the original front-line platoons of the 8th Company. He sees that other German units are moving south through the gap between the road and the river.

The battalion commander then returns to point R where he finds the fourth and remaining platoon of the 8th Company in reserve. He orders this platoon forward to reinforce the line B-G. The platoon moves out at once.

Then the battalion commander sees a body of men moving south between the Bois Chanel and the line B-G. It is either men of the 8th Company withdrawing from line B-C or Germans who have broken through line B-C. They come on quietly and the battalion commander cannot tell whether they are French or Germans. Finally as they arrive even with point R a few low spoken words are heard. They are Germans.

Almost immediately a savage melee breaks out between this force of Germans and the 8th Company. There is now considerable firing and confusion, and between the 8th Company and their assailants there is fierce hand-to-hand fighting.

The 7th Company is in column on the path P-R with its head a short distance in the woods. It is not far from the scene of this struggle but the darkness, the wild firing, and the attendant confusion make it difficult for the 7th Company to come to the aid of the 8th Company.

Since midnight when the attack began it has become apparent that the enemy's attack is general. Sounds of combat indicate that the French west of the Aire River are being heavily attacked. The battalion commander has also heard firing from the direction of Seraucourt. Reports have reached him that the enemy has worked around the northeast corner of the Bois Chanel.

At no time since his arrival in the Bois Chanel has the battalion's mission been clearly defined by higher headquarters. By now, however, the battalion commander is of the opinion that his battalion is a covering force sent forward to hold the Bois Chanel while the division

prepares its main position on the line Bois Landlut—hill 309—Anglecourt. The battalion is not in communication with the unit in its rear and the battalion commander must make his own decision as to what to do.

THE WITHDRAWAL

Realizing that the battalion was about to be cut off and convinced that he had accomplished the mission of covering the division long enough to enable it to organize the main position in rear, the battalion commander gives the order to withdraw to the line O-Q-S which is well known to the companies of his battalion. The 6th and 7th Companies and the section of machine guns withdraw successfully. Only parts of the 5th and 8th Compaines succeed in withdrawing.

Shortly after 2:00 AM the battalion withdraws through the regimental position at Courcelles.

The battle continued until about 9:00 AM, at which time the German attack had been stopped on hill 324.

THE PICTURE FROM THE GERMAN SIDE
GERMAN FIFTH ARMY

When the XIII and XVI Corps of the German Fifth Army reached the line Triacourt—Jubecourt on 5 September the Crown Prince prescribed objectives for 6 September as follows: (See Figure 42). The XIII Corps on the right was to secure the crossings over the Ornain River at Mussey, Varney, and Fains (west of Bar-le-Duc), and the XVI Corps on the left was to take Bar-le-Duc. Consequently, in the initial phases of the attack the zone of action of the German XVI Corps lay east of the Aire River and included the Bois Chanel and the position occupied by the French 40th Division. The entire zone of the XIII Corps lay west of the Aire River.

But as we have learned, the Crown Prince's army did not reach its objectives on 6 September. Instead, his

troops suffered heavily from French artillery fire on this and the next few days and made little progress. It was in an attempt to escape the well placed concentrations of the French 75's that the Crown Prince ordered an attack by his XIII and XVI Corps for the night of 9/10 September.

THE GERMAN 30TH INFANTRY

For this attack the 34th Division which was the right division of the German XVI Corps, assigned to its right brigade the zone bounded on the right by the Aire River and on the left by line Deuxnouds—Rignaucourt, inclusive. (See Figure 43). It was the right regiment of this brigade, the 30th Infantry, which had the Bois Chanel in its zone of action during the night attack of 9/10 September.

The 30th Infantry, which was garrisoned in the Saar before the war, had been actively engaged since the Battle of the Ardennes 22 August but had not lost heavily. The day of 9 September was spent in reserve in the covered ravines south of Bulainville where the companies of the regiment each received replacements from the recruit depot. These new men had only a few hours in which to become acquainted with their leaders and comrades.

At dark the regimental commander assembled his battalion and company commanders and after distributing a number of iron crosses won in previous combat, issued his orders for the night attack. The lower commanders had received no warning order and were thus prevented from making a daylight reconnaissance of the terrain over which they were to attack. The only daylight reconnaissance made of Bunet Creek was by the officers' patrol which the French drove from Amblaincourt. And the regimental history states that it brought back nothing of value concerning the enemy.

The attack of the 30th Infantry had as its objective the signal tower east of Bois Landlut.

The formation prescribed was for the 2d Battalion to be the right assault battalion and cross Bunet Creek south of Amblaincourt. It was to move south between the Aire River and Bois Chanel until the southwestern corner of Bois Chanel was reached. Then it was to turn to the left and advance eastward over hill 309 to the regimental objective. The battalion was thus to pass around the Bois Chanel outside its western and southern edges. The 3d Battalion was to be the left assault battalion and cross Bunet Creek opposite the Bois Chanel. It was to pass along the northern and eastern edge of the woods to the regimental objective. The 1st Battalion was to follow in the center of the zone. This gave the 1st Battalion the almost impossible task of traversing the entire length of the dense Bois Chanel. The assault battalions were to move in a line of columns, each in column of squads. The columns were to be preceded by a dense line of skirmishers.

The colonel added these instructions: "Rifles will not be loaded. The enemy must be crushed by violent assault. Observe silence, no commands in a loud voice."

THE GERMAN ATTACK

The units of the 30th Infantry were in their assigned positions by midnight. The order to advance was given and the line moved forward. When the 2d Battalion came within 100 yards of Amblaincourt it came under fire from a French outguard in the village. The Germans charged forward and the outguard gave way. As they withdrew the French set fire to piles of straw which had previously been saturated with gasoline. The fires spread rapidly through the village and the Germans were silhouetted against the flames after they passed Amblaincourt. There were hedges and barricades as well as Bunet Creek to be passed. The confusion was further increased by the

small arms fire which came from the Bois Chanel. Units lost direction but pressed on despite confusion and heavy losses. By 2:30 AM the Bois Chanel was in the hands of the Germans. But the cost was great. Meanwhile, the rain continued to fall and all was confusion.

After taking Bois Chanel, the Germans, according to French reports, pressed on up the slopes of hill 309 in columns of fours at close intervals. The Germans could be seen only when silhonetted against the flames of the burning village in their rear. The battle raged and the French line was penetrated at a number of points until German units had advanced as far as the French artillery positions on hill 324 where they captured the guns. But the fight did not stop then. The savage melee continued until almost daylight, by which time the French units had rallied to the sound of bugles and recaptured the lost guns by a desperate charge.

When daylight came the Germans held the line: Anglecourt—hill 309—eastern edge of Bois Chanel.

Losses were heavy on both sides. Casualties in the German regiment are placed at 19 officers and about 50 percent of the men. The history of the 30th Infantry describes the night of 9/10 September 1914 as the regiment's bloodiest and most frightful action of the whole war. A French account states that the 155th Infantry lost in killed, wounded and missing, a total of 6 officers and 435 men. This same source declares that the village of Amblaincourt was not set on fire by the French but by the Germans. In either case it appears the flames operated more to the advantage of the defenders than the attackers.

COMMENTS

A well known French writer develops the following points in his analysis of the action in Bois Chanel:

a. A night attack over unreconnoitered terrain by a force as large as two corps offers little prospect of suc-

cess. In this case the accomplishment of the mission was made doubly difficult by fixing such poorly defined and distant objectives. We read today that the Crown Prince had little faith in the success of the night attack but had yielded to the opinion of one of his corps commanders. Late in the afternoon of 9 September the order was countermanded but word did not reach the assault units in time to prevent the attack at midnight.

b. The defensive dispositions of the 2d Battalion 155th Infantry were inadequate. The position should have been wired and properly intrenched, especially on the left (8th Company). However, there was a natural repugnance to intrenchments at the start of the war which was probably caused by lack of peace-time training in this subject.

c. The comparatively large reserve on the night of 9/10 September—nearly two companies—was almost useless because of the difficulty of debouching from the narrow paths to enter the action. It would have been better to have placed these companies with the 8th Company between the Bois Chanel and the Aire River, which was the logical place for the enemy to make his main effort. In adopting present-day tactics and armament to the problem confronting the 2d Battalion 155th Infantry, the French writer expresses the view that positions should be organized for three companies, each disposed in depth and properly intrenched (with wire) for all around defense, as follows:

One company 500 yards northwest of Anglecourt.

One company at the northwest corner of the Bois Chanel.

One company about Seraucourt.

The approaches to, and surroundings of these strong points, to be protected by artillery concentrations.

d. The commander of a covering force like the 2d Battalion 155th Infantry is entitled to know difinitely whether his mission is to continue to hold in position even though cut off by the enemy; to withdraw only on orders of the higher commander; or to withdraw when, in the opinion

of the commander of the covering force, it becomes necessary to do so. The higher commander should inform all concerned of the signals to be given and what routes are to be followed by the covering force when it withdraws. The 40th Division failed to do this and the result was that the 2d Battalion 155th Infantry was fired into by units on the main position which did not know that the 2d Battalion was withdrawing.

e. Especially at night is it true that the success of the defense depends principally on the preparation it has made before the attack begins.

The views of the French writer, Colonel Etienne, are in accord with our present-day doctrine.

CONCLUSION

From the foregoing account we catch a glimpse of what night operations are like. We see further proof that an offensive action at night is such a difficult operation that it should not be attempted without experienced troops and adequate time for preparation. The defender will find it difficult to move his reserves at night and should therefore not adopt a plan which relies too much on the employment of mobile reserves. As for the defense of an outpost against an attack, we may conclude that the covering force must be given definite instructions as to how long to hold in case of attack.

CHAPTER 7

Conduct of a Command Post Exercise

(INFANTRY SCHOOL TEACHING)

A command post exercise is a field exercise in which the troops and armament of one side are imaginary or outlined and those of the other consist only of command, staff, and communication personnel. The primary purpose of such an exercise is to train commanders and staffs in the technique of staff organization and functioning.

Infantry units have for some years made use of command-post exercises as a training expedient. Of late, however, there has been a marked increase of interest in this type of exercise, no doubt because of the wide publicity given to the series of large command post exercises directed by the War Department.

Officers, particularly those on duty with the civilian components, have had to prepare command post exercises as a standard part of the training programs. To be able to do this efficiently, the officer should know precisely what he is striving to accomplish, and since his time is always limited, how to accomplish the most in the shortest period of time. There is a technique to this work as there is to every other instructional method.

It should be understood that in this chapter we deal only with infantry units and such troops as would normally be in their support.

The command post exercise outlined in this chapter may be used, just as it is written, by officers of all components of the Army for training purposes. But it should be

remembered by officers adopting the problem, that since their units will not be on the ground as they were at The Infantry School, the problem—if used as written—will partake of the quality of a map exercise. This, however, is not a bad method to start the elementary training of officers in staff and command duties. In fact, it is probably one of the best methods.

However, one command post exercise can never complete the training in staff and command functioning. A progressive series of exercises will be needed, which, particularly with the civilian components, may extend over a period of two or even three years. Therefore, the ability to devise a series of exercises to fit local conditions is of great importance. For this reason it is believed that more good can be obtained from this chapter if the mechanism outlined for conducting a command post exercise is carefully studied. This will enable other exercises to be prepared with a minimum of effort. If the varying local conditions are carefully considered and a tactical problem outlined to fit conditions, then little trouble will be experienced in casting this tactical problem in the form of a command post exercise.

On the other hand, like everything else in military instruction, this should not be considered as furnishing a hard and fast form or method. It may, and should be, modified to suit conditions. It is a guide which should prove helpful in originating and conducting a command post exercise.

Study will disclose that the exercise is divided into two phases: one, the period covering the movement of troops into position for the attack; the other, the period from the initiation of the attack until the termination of the exercise. It is possible to prepare messages beforehand for the first phase. The second phase should preferably be left to the umpires to develop in accordance with the actions and orders of unit commanders and the principles it is desired to inculcate. "Canned messages" should be used with caution. This is more fully discussed hereafter

under Instructions for Umpires.

It is feasible to use the exercise for a brigade command post exercise or for a regimental one. In the latter case the left regiment will work into a more interesting and effective problem. However if used for a regimental problem, the brigade order will have to be issued by the author.

THE TACTICAL PROBLEM

1. *SITUATION.—a.* Maps: Accompanying situation map. (Geological Survey, 1:62,500; Columbus quadrangie). (Map in pocket in back of book. Figure 46)

b. (1) The Upatoi Creek forms part of the boundary between two states, Blue (south) and Red (north). Red has an infantry brigade and a regiment of field artillery (75-mm) stationed in Columbus. The infanry brigade is completely motorized; the artillery is truck-drawn. Blue has an infantry division with a squadron of cavalry, reinforced, stationed at Ellaville, about 25 miles east of Cusseta.

(2) Red and Blue have the same tactical organization.

c. (1) At 2:00 PM, 19 November, General 8th Division, at Ellaville, received the following instructions:

"Reds are expected to declare war sometime today. There is no change in the situation. You will move at once with your division and prevent any Red invasion of Blue territory between Eelbeck and Fort Benning (both inclusive)."

(2) In compliance with these instructions, the 15th Brigade, reinforced by the 23d Field Artillery (75-mm gun truck-drawn) (less 1st Battalion) with 1st Battalion 22d Field Artillery (75-mm gun horse-drawn) attached, the 1st Battalion 24th Field Artillery (155-mm howitzer), Troop A 8th Cavalry, 1st Battalion 8th Engineers, Detachment 8th Medical Regiment, and detachments of the quartermaster regiment, was moved by motors and marching to the vicinity of Cusseta, where it bivouacked the

night of 19/20 November (see Figue 46). Brigadier General 15th Brigade was given the mission of preventing a Red invasion of Blue territory between McBride's Ford and Fort Benning (both inclusive). The remainder of the 8th Division marched on Eelbeck, bivouacking the night of 19/20 November seven miles southeast of Eelbeck.

d. By 11:00 PM, 19 November, the 15th Brigade had completed its movement into bivouac areas in the vicinity of Cusseta.

THE SUPPLY SITUATION OF THE BRIGADE

The following information regarding supply was in possession of Brigade S-4 upon the arrival of troops in the Cusseta area at 11:00 PM, 19 November:

1. The railhead is operating at Ellaville (25 miles east of Cusseta) and will move to Cusseta upon request of 15th Brigade. The next daily train is due to arrive at Ellaville at 6:00 PM, 20 November. Class-I supplies will include an A-ration.

2. The trucks of the quartermaster train carry a B-ration for the brigade, as reinforced, and 40 tons of small arms ammunition.

3. The refilling point is located at Ellaville and contains two days of fire for all weapons of the brigade.

4. A motorized detachment of the ammunition train accompanied the artillery with the brigade and contains 30 tons of 75-mm ammunition and 40 tons of 155-mm ammunition.

5. The provisional medical battalion is entirely motorized. The brigade surgeon has been notified that evacuation will be by division.

6. Service trains, upon arrival on 19 November, bivouacked in the vicinity of Cusseta.

7. Field trains carrying normal loads accompany their respective units. Two meals remained with the kitchens after supper 19 November.

8. Combat and company trains, with normal loads of ammunition, are bivouacked with their units. Extra ammunition had not been issued by 11:00 PM, 19 November, except to detachments which had been sent forward.

DEVELOPMENT OF THE TACTICAL SITUATION

1. At 11:00 PM, 19 November, a detachment which had been sent via the Cusseta—Columbus road to destroy the road and railroad bridges north and northwest of Ford Hill, reported that it had been unable to reach its objective. It reported that enemy detachments were blocking the roads at RJ 390 and at the road junction three-fourths mile north or RJ 320. (About one and one-half miles southwest of RJ 390.)

2. At 1:30 AM, 20 November, a detachment which had been sent via the road: Cusseta—CR 460—Fort Benning, to destroy the bridge at Fort Benning, reported that it had reached its objective without encountering hostile troops and had destroyed the bridge. It reported, however, that the enemy was blocking the First Division Road near the road junction one mile west of Harmony Cemetery.

3. At 2:00 AM, 2- November, a Blue ex-soldier, whose home was at Ford Hill, arrived at Brigade Headquarters in Cusseta. He said that small enemy detachments in motors going eastward had passed his house about 4:00 PM, 19 November, and that the head of a column of several hundred trucks of infantry and artillery had followed about 8:00 PM. He added that he had been unable to telephone Cusseta since 7:00 PM, 19 November.

4. At 2:00 AM, 20 November, the following message was received from the Commanding General 8th Division:

"Reliable information indicates that the hostile brigade stationed in Columbus left that place at dark last night. One infantry regiment with a battalion of artillery (75-mm) marched towards Cusseta via the Columbus-Cusseta

road; the remaining infantry regiment and artillery marched towards Eelbeck via the Buena Vista Road. Detachments of the 8th Division have been unable to advance beyond a point five miles southeast of Eelbeck.

"GHQ informs the division that the arrival of any other Reds east of the Upatoi before dark tonight, 20 November, is unlikely.

"A detachment of the 8th Observation Squadron will begin operating with you at daylight this morning.

"Your mission remains unchanged."

5. The 15th Brigade, reinforced, marched from its bivouac area at 4:00 AM; 20 November, in two columns whose routes and principal components are shown in Figure 46 (in back of book). Troop A 8th Cavalry, which had been covering the left flank of the brigade from the vicinity of BM 293, was ordered to move via Goodhope Cemetery and determine the presence of any enemy in the area west of the line: Goodhope Cemetery—Harmony Cemetery.

6. A Red observation plane appeared over Blue columns and bivouac areas shortly after daylight, 20 November. About 4:30 AM, hostile artillery shells began falling along Cusseta—Columbus road as far southeast as RJ 485. Red observation aviation continued active near the Blue columns.

7. At 4:45 AM, 20 November, a dropped message from the Blue air observer contained a sketch showing Red organized positions in the area southeast of Harmony Cemetery and Red infantry and motor vehicles in the area north of Harmony Cemetery (see Figure 46). This information was obtained at 4:35 AM.

8. At 5:30 AM, a message from the commander of the advance guard of the right column stated that his leading elements were fired on at 5:20 AM, as they approached the stream crossing one mile north of CR 455. The fire came from Reds occupying the positions shown in Figure 46. The advance guard commander further stated that he estimated the enemy to be part

of the Red outpost and that he was attacking at once, enveloping the hostile southwest flank.

9. At 5:40 AM, the Blue air observer dropped another message at brigade headquarters, reporting no change in the enemy situation as previously given, except that some infantry were assembling along the stream line about 1½ miles southeast of Harmony Cemetery.

SITUATION WHEN THE COMMAND POST EXERCISE OPENS

At 5:45 AM, the Blue situation as known to Brigadier General 15th Brigade, at his command post near RJ 485, is as follows (see Figure 46):

a. The advance guard, right column, is moving to attack the enemy outpost position. Battery D 23d Field Artillery is firing from positions shown in Figure 46.

b. The head of the main body of the right column is halted along the Cusseta—Columbus road as shown in Figure 46. Rear elements are still in the bivouac area.

c. The left column is marching along the road as shown in Figure 46. Rear elements are still in the bivouac area.

d. Troop A 8th Cavalry, now in the vicinity of Harps Pond, is reconnoitering the hostile right flank.

REQUIREMENT

a. Brigade warning order as of 5:45 AM. (This should be prepared previously in order to avoid a period of inactivity by lower units.)

b. The actual preformance of the duties of commanders and staffs from 5:45 AM until the completion of the exercise.

NOTES

1. For this problem assume that sunrise is at 4:47 AM, and suset is at 6:31 PM.

2. The road: Jamestown Cemetery—CR 452 is an improved dirt road capable of standing all motor traffic in dry weather only. The road: CR 485—Goodhope Cemetery is passable in good weather for light vehicles, including light trucks.

INSTRUCTIONS FOR UMPIRES

PART ONE

The purpose of this command post exercise is to give practical instruction in the functions and duties of commanders and staffs in all echelons of a brigade acting alone.

The problem is drawn for a brigade reinforced with a regiment of light artillery, a battalion of medium artillery, a troop of cavalry, engineers, and service troops. It can be used for a brigade (reinforced) or any portion thereof.

The conduct of the exercise is divided into two phases as follows:

1. The first phase includes the time required for the issue of orders, and the movement of troops (imaginary) into position for the attack. The maneuver time covered by this phase is from 5:45 AM, when the problem opens, until the initiation of the attack, about 11:00 AM. It is not possible to state a definite clock time at which this phase will start; that will depend on local conditions and the hour the unit desires to start the exercise. In general about two and a half hours are necessary for this phase, but this will vary. In any event the clock time and the maneuver time will not coincide.

2. In the second phase the action covers the time from the initiation of the attack until the termination of the exercise by the chief umpire. This should be not later than 3:30 PM and should, in general, be about the time when the brigade commander commits his reserve. This

phase should be planned to start at 11:00 AM. If this, because of local conditions, is not possible all watches should be set at 11:00 AM no matter what hour this phase starts.

PRELIMINARY INSTRUCTIONS

The commanders and staffs participating in the exercise will assemble for preliminary instructions prior to starting the problem. Upon completion of this, commanders and staffs will proceed to their headquarters. The first phase will then begin.

FIRST PHASE

Umpires will inform the headquarters to which they are assigned that it is 5:45 AM, maneuver time, and that participants will assume that they are at the location indicated in the problem at 5:45 AM.

Since the brigade staff has previously solved (from the map) the initial requirements, orders initiating the necessary action should be issued from brigade headquarters at once.

From this time until the hour set for the attack, all unit commanders and staffs should perform the duties necessary to make proper troop dispositions for the attack. This will include making the necessary reconnaissances, if feasible, issuing orders for the attack, and establishing the command posts. Since the actual time must correspond to about five hours, maneuver time, it is not practicable to follow a time schedule during this period. Messages and orders may be timed approximately by the headquarters originating them. The main idea is to get the orders issued for the attack and to get command posts established.

SECOND PHASE

In so far as is practicable, the course of the maneuver in this phase will follow the action as indicated in orders issued by the several headquarters.

Based upon the brigade solutions made previous to the date of the exercise, messages sufficient to insure general control of the action will be given to umpires for distribution to the headquarters concerned. These messages should be logical and fit into the situation. If there is any chance that this cannot be done, then the message should be omitted and reliance placed upon the umpire. However, it is usually possible to write a number of messages regarding supply and administration. Generally these matters are not immediately and vitally affected by minor tactical changes.

In any event sufficient direction should be given the brigade, when it makes up its solution prior to the start of the actual exercise, to insure the action proceeding generally as follows: The brigade will attack with regiments abreast, the 29th Infantry on the left. The 29th Infantry will make the main effort in the general direction: RJ 325 (¼ mile northwest of Gilbert Creek)—RJ 455 (1 mile north of Harmony Cemetery). The 30 Infantry will attack the known enemy position to its front.

Red is disposed as shown in Figure 46. The infantry is distributed as follows: One battalion occupies the forward part of the organized area; one battalion about 1½ miles south of Harmony Cemetery is furnishing the outpost and prepared to occupy the rear of the occupied area, which it has organized; the third battalion is assembled north of Harmony Cemetery. Figure 46 gives the location of the artillery so far disclosed. Reds will, in consequence of Blue maneuver indicated above, move the battalion now near Harmony Cemetery to meet the threat of the 29th Infantry, and subsequently move the battalion now about 1½ miles south of Harmony Cemetery to meet whatever serious threat develops.

Thereafter during the progress of the exercise, umpires influence Blue action by furnishing Red information to the Blues. This information will be the sort that would normally come from front-line companies, air observers, patrols, observation posts or other means used to obtain information of the enemy. Umpires will represent these agencies, furnishing, at the proper time, the information which would have been obtained by the agent. Care must be taken to see that information goes to the proper person. For instance, battalion commanders do not normally get information direct from air observers. Such information comes down the chain of command. On the other hand, the regimental or brigade commander does not get the location of companies in the front line from the umpire. Such information should come up from the battalions and will be furnished to the battalion commanders by the battalion umpires. However, when the regiment or other higher echelon installs an observation post or sends out a special patrol, the sending agency should be given the information that would likely be obtained. To broadcast information destroys one of the chief values of the exercise—the training in passing information smoothly back and forth.

Progress of the action is controlled by phase lines. Prior to the play of the exercise, a map based upon the brigade commander's solution of the initial situation should be issued to each umpire. This map should show the general line of contact of the two forces at the time when the Blue attack is launched. It will show also the *general* line of contact when the situation should cause the brigade commander to employ his reserves for a continuation of the attack. Intermediate phase lines should be selected by the umpires at the several subordinate headquarters after these subordinate headquarters have issued their attack orders.

The situation should be developed gradually so that by about 3:30 PM all Blue troops except the brigade reserve should have been committed to action. The pre-

cise location of the Blue line at this time will depend on the action taken by subordinate commanders. The exercise will terminate as soon as the brigade commander has reached his decision for continuing the attack.

In addition to the duties outlined above, umpires give individuals such instruction as is necessary to insure proper functioning of the headquarters. This is not a test but a period of instruction.

INSTRUCTIONS FOR UMPIRES

PART TWO

It is not possible to furnish the messages that should be prepared for carrying the exercise through to its completion. The reason for this is that such messages depend on the details of the brigade order and the orders of subordinate units. Each brigade staff, although it may be deftly directed to move in a certain direction, will have its own idea of how it should be done. Subordinate unit action is still more difficult to predict. Hence, the impossibility of furnishing a full scenario, if the exercise is to allow any play of individual judgement—which it should.

However, in order to show the type of messages which can be given out, and particularly the form for listing them, the messages given below should be studied. These are messages that depict Red reaction to Blue movement into attack position—regiments abreast—with the decisive attack to be made in the direction RJ 325—RJ 455. If the brigade plan is different, of course, these messages do not apply. The messages should be furnished at the time shown in the left-hand column. They are not to be considered as a complete list of the messages to be expected under the conditions. They are but an illustrative extract.

It is well to make note here that too much care cannot be given to the preparation of such messages. A mistake

easy to fall into, is writing a message for a unit on the right that the writer assumes can only be—say, the 1st Battalion. However, the regimental commander uses this battalion on the left or in reserve. Consequently when the exercise starts and messages come in the utmost confusion results at the command post. This will very likely lead to a complete failure of the exercise. Often it is better to list messages as coming from the right or left unit and let the umpire at the command post fill in the name of the unit—company, battalion, or regiment—before he passes the message to the commander.

Following is the list of messages:

Time (Clock)	*Unit Sending Information*	*Unit Receiving Information*	*Maneuver Time*	*Message*
8:46 AM	1st Bn 30th Inf	30th Inf	6:10 AM	Attack by advance guard against enemy outpost launched at 6:00 AM.
8:48 AM	Air Observer	15th Brig	6:20 AM	Enemy troops estimated as one battalion with heavy machine guns and motors moving southwest from Harmony Cemetery area. Leading elements at 6:15 AM about one-half mile southwest of Harmony Cemetery.
8:50 AM	1st Bn 30th Inf	30th Inf	7:10 AM	Enemy outpost began withdrawing to northwest at 7:00 AM.
8:53 AM	Troop A	15th Brig	7:15 AM	Enemy troops gained contact with my patrols along general line: RJ 415—BM 430 about 6:45 AM. My patrols falling back slowly.
8:56 AM	Air Observer	15th Brig	7:15 AM	Enemy in force at 7:10 AM advancing against cavalry. Leading elements now along general line: marsh three-fourths mile southwest of RJ 415—RJ 342.

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Time (Clock)	*Unit Sending Information*	*Unit Receiving Information*	*Maneuver Time*	*Message*
8:58 AM	Troop A	15th Brig	7:45 AM	My patrols, at 7:30 AM, are along the line: south bank of the stream running southeast from RJ 342—Harps Pond. Enemy in strength seems to be advancing southwest against me.
9:04 AM	Air Observer	15th Brig	8:15 AM	At 8:10 AM enemy outpost was withdrawing around west flank of enemy position.
9:06 AM	Air Observer	15th Brig	8:25 AM	At 8:15 AM Troop A seems to be holding along a general line: Harps Pond—382.
2:00 PM	8th Div	15th Brig	2:00 PM	8th Tank Company (less one platoon) will arrive at Cusseta at 2:30 PM today and will be immediately attached to your brigade.

CHAPTER 8

Training Films and How to Use Them

"One picture is worth ten thousand words."
Confucius

"He was a wise man who said, 'Let who will make my country's laws, so long as I may write her songs,' and I do not think that the song ever had a greater influence upon the lives and characters of the people of any country than the picture is destined to have."—Right Honorable Lord Asquith.

The fact that the army has a stock of motion picture training films that are of great value in instruction is not fully realized. Neither is it generally realized that steadily during the last several years The Infantry School and the Signal Corps have cooperated in turning out excellent films that no infantry commander interested in training—and who is not—can afford to overlook. As a consequence this chapter is written to indicate the scope of the army's project, the value of instructional films, the technique of using them, and the type of films available.

The value of motion pictures as an effective method of instruction is recognized by all leading educators. From many tests it has been found that these pictures produce increased initial learning, increased interest in the subject, and stimulate self-activity and voluntary reading. The result is that when educational talking pictures are used to supplement classroom instruction the students

gain fifteen to forty per cent more knowledge of the subject than students who receive only the standard classroom instruction.

To the army this is highly significant. For the army is virtually a great training institution, and no one ever heard of a commander or an organization that could go about its training tasks leisurely. Always the emphasis is on making every minute count. In war time the necessity for reducing the time element in training will be paramount. Hence, it is impossible to neglect the motion picture as an instructional medium. We have more than an academic interest in it.

In our outline of the army's venture with instructional films we can neglect the history of educational pictures and the army's part as a pioneer in the movement before and during the World War. Our modern system of training films dates from about 1928, when a definite program of production was adopted. The Signal Corps was charged with the technical production matters. It was to work in close cooperation with the various branches of the service, each of which determined the content and scope of its particular films. The first films made were of the silent type.

Later, in 1930, the Signal Corps acquired a sound recording channel and in 1931 and 1932 a few silent films were revised by adding "off-stage" voice monologue in order to make the films more effective. Since then additional sound pictures—both natural sound and monologue type—have been made and released. So far, a total of nineteen sound training films have been released and three additional subjects are now in the various stages of production. Twenty-one silent training films have also been released.

As can be seen, we have the films and the question arises of how to use them properly. This will take more than a little thought since the films are not meant to entertain but to teach, and, therefore, we must understand their peculiar teaching technique if we are to fit

them into our army instructional system. To indicate how this can best be done, it will be necessary to survey first the technique of army training methods.

Training in the army is based upon the applicatory system of instruction, in which individuals or organizations under instruction are required to apply the principles or methods to an assumed or outlined situation. There are six steps or phases in this system. These are:

(1) Preparation on the part of the instructor.

(2) Explanation.

(3) Demonstration or illustration.

(4) Application or practice, to acquire skill in execution.

(5) Examination or test, to determine progress or proficiency.

(6) Discussion, to correct method of execution.

There are "No royal roads to learning" or "get-rich-quick short-cuts" in the above system. In the majority of cases this method requires physical as well as mental execution by the student. Obviously then, training films cannot be used as the only means of instruction but must be fitted into the standard educational method. Their role must be that of an aid and never that of a teaching robot usurping all the functions of the instructor—as extreme enthusiasts may sometimes contend. Accordingly, the first question that naturally arises is, just where in our six step method can training films be used to the best advantage?

The answer to this question is discussed below.

Preparation on the part of the instructor.—Training films may be used in this phase by showing the film before an audience of officers and noncommissioned officers who are to be used as instructors. The film serves to refresh the memories of the individuals in the audience and sets up a standard method of instruction to be used within the unit.

Explanation.—Training films present an explanation in a short space of time. While it is not expected that

every small detail can be covered, the film does present a standard explanation correlated with animation or scenes.

Demonstration or illustration.—Sound pictures are of the greatest value in this phase. Here the students see a pictured demonstration of the subject with a standard comment by an offstage voice, or a natural sound demonstration in which the people taking part in the demonstration do the talking. Such pictures provide means for visually demonstrating operations to large groups where lack of facilities prohibits the class from seeing an actual demonstration.

Imitation or application.—The present training films are of no value in this phase. It would be difficult to design a standard film to be used here. However, this does not mean that pictures cannot be taken of men trying to acquire skill in execution and afterwards showing this film to the men. Each man could see himself and pick out readily his pronounced errors. Such photographic work could be done with the portable, cheap motion picture cameras now on the market. But this is quite different from using a standard film for instruction. This is another method of using motion pictures for instructional purpose which it would pay well to exploit.

Examination.—Training films will frequently aid in this phase by providing a visual yardstick, or standard, against which individual or unit proficiency may be measured.

Discussion.—Training films show the correct method of execution. They find use in this step as a final review which has the effect of tying together all elements of instruction.

So much for where the films should be placed in the instructional scheme. But that does not end the matter. After placing the film in the proper place the question comes up as to how it is best used. Experience shows that the instructor who uses the picture mainly to arouse the interest of his students and lets the matter rest with

one projection of the subject, fails to get full value from the material.

The proper technique for using educational pictures, as developed by many schools and colleges, includes an explanation of the material before the film is shown. This acquaints the student with the high lights of the film and enables him to watch the film critically. After the first showing a period of discussion follows. At this time all elements of the film may be discussed freely and completely. Then follow a period of teaching, after which the picture is presented a second time in order to clarify concepts which are pertinent to the subject. This second showing is generally given at a point about halfway through the study of the subject. At the completion of the study the picture is again shown to crystallize and vitalize the subject matter. This third showing serves as a review, tying together all elements which have been studied.

To illustrate how this may be done let us take the new infantry film, *Musketry and Combat Practice Firing*. To use this most effectively, the troops should be assembled and in a short talk the important parts of the film should be indicated and they should be cautioned to watch for them. Then the film should be shown. This should be followed by a disccussion period. After this the men should start their practical work. About the middle of the practical instruction work the film should be shown again to clarify obscure points. At the completion of the instruction the film should be shown as a review. If possible, a like procedure should be used for the instructor personnel prior to beginning the instruction period. This will serve to standardize instruction. This technique of using films will enhance the instructional value of the films and enable a great mass of subject matter to be absorbed in a short time.

Training films may be obtained by application to the corps area or department commander. Users of the films are required to pay the transportation costs both ways.

Films are now being turned out in two sizes—the standard size, 35 millimeter, and the substandard size, 16 millimeter. The latter type film can be used in the small portable projectors now being built for homes and schools. They have the great advantage of requiring no fire-proof projection booth. Since the films come in two sizes it is necessary when applying for them to specify the size desired. At present, preparations are going on for turning out 16-millimeter sound pictures but the films of this size so far released are of the silent type.

For any sound picture which it is desired to run as a silent picture, a mimeographed lecture is furnished. The instructor should rehearse this lecture with the picture in order to obtain, as nearly as possible, voice synchronism with the action in the picture. All subjects are available in the 35-millimeter size. Certain films are also available in the 16-millimeter size, and this is stated in the list below.

Very shortly two other infantry films, now in preparation, will be released. One film covers bayonet training and the other deals with infantry field fortification and camouflage.

Following is a list of pictures so far released. Since it is often desirable to show a film of the supporting arms in order to give—in post schools and the like—the role of the supporting arms, and since a great many films not strictly of infantry, or even army production, can profitably be used by the infantry, no attempt is made to limit the list to films of a strictly infantry nature.

SOUND FILMS

TF 1 *The Tactical Employment of the Antiaircraft Artillery Regiment.* 2 Reels.
(16-mm silent also.)
(The functioning of an antiaircraft regiment to include communications, intelligence service, searchlights and sound locators, caliber 0.50 machine guns, 3-inch guns and mechanical instruments for computing and transmitting firing data.)

TF 9 *The Tactical Employment of a Battery of 155-mm Guns, Tractor-drawn (Coast Artillery).* 2 Reels.
(16-mm silent also.)
(The gun battery, in route column, going into position, firing, and fire control systems.)

TF 10 *Tactical Employment of Chemical Troops in an Attack.* 2 Reels.
(A chemical company in support of a division in an attack; use of smoke in screening operations of infantry.)

TF 12 *Map Reading.* 5 Reels.
(May be run in two sections. Reels 1, 2, and 3 show types of maps, scales, conventional signs, distance, direction, latitude and longitude, rectangular and polar coordinates. Reels 4 and 5, elevation, contours, slopes, profiles, and visibility.)

TF 13 *Signal Communication Within The Infantry Regiment.* 5 Reels.
(The functioning of a communication platoon of an infantry regiment to include selecting and establishing command posts, movement of command posts, and the functioning of the various communication agencies available to regimental and battalion commanders.)

TF 14 *A Cavalry Command Crossing An Unfordable Stream.* 2 Reels.
(The preliminary individual training of the trooper in the preparation of loads and methods for ferrying an unfordable stream. A cavalry regiment crossing an unfordable stream including reconnaissance and selection of the point for crossing, crossing by personnel, ferrying of equipment, and measures taken to protect the command from attack during crossing.)

TF 15 *Reconnaissance and Occupation of a Position.* (By a 75-mm battery of artillery, horse-drawn.) 2 Reels. (Artillery battalion supporting an infantry regiment in the attack. Action of the artillery liaison officer with the infantry regiment. Artillery fire during the attack.)

TF 16 *The Pioneer and Demolition Section Cavalry Regiment.* 2 Reels.
(Equipment carried by the section and the method of using demolitions equipment. A tactical situation in which the section is used to interrupt the enemy lines of communications by destroying telephone lines, railroad track, and a bridge along highway.)

TF 17 *The Cavalry Rifle Platoon From Mounted to Dismounted Action.* 2 Reels.
(The action of a cavalry rifle platoon with attached light machine-gun squad acting as advance party of an advance guard as it gains contact with the enemy. It shows the method of securing horses after dismounting for action, and how they may be left mobile or immobile.)

TF 18 *The Tactical Employment of 0.50 Caliber Machine Gun by Cavalry.* 1 Reel.
(The method of carrying, dismounting and using caliber 0.50 machine gun. A tactical

situation showing its use against armored cars.)

TF 19 *Sensing Field Artillery Fire.* 3 Reels.
(The method of sensing fire. A 75-mm battery firing high explosive shell, shrapnel and smoke shell.)

TF 20 *Infantry Crossing an Unfordable Stream.* 1 Reel.
(This shows an infantry battalion crossing an unfordable stream without bridge, boat or other than normal equipment.)

TF 21 *The Rifle Squad in Combat.* 4 Reels.
(This shows a rifle squad acting as the point of an advance guard, a rear point, a flank guard, and its action when on other security missions. It also shows a platoon in the various phases of the attack. It brings out particularly well the action of a flanking squad.)

TF 24 *Musketry and Combat Practice Firing.* 6 Reels.
(This picture takes up training in range estimation, target designation, landscape and miniature range firing, rifle fire and its effect and firing at field targets. It includes combat exercises showing the action of the squad and section.)

TF 26 *The Medical Regiment.* (Medical service with an infantry division.) 6 Reels.
(This picture portrays the work of the division medical service in battle. It shows the various activities in approximately the order in which they occur. It takes up the work of the division surgeon, collecting battalion, ambulance battalion, hospital battalion, veterinary company and service company.)

TF 27 *Attack Aviation.* 2 Reels.
(This picture sets up a problem for the use of attack aviation against enemy airdromes, and

illustrates the plan and execution of the attack.)

TF 28 *The Employment of Machine Guns in the Attack.* 3 Reels.

(This picture shows the action of a motorized machine-gun company in support of a battalion in attack, including the displacement forward, the occupation of positions and the firing. It also shows a platoon supporting a rifle company in a flanking action and firing on a counterattack.)

TF 29 *The Employment of Machine Guns in the Defense.* 3 Reels.

(The machine-gun defense of a battalion sector, including the emplacement of guns and camouflage of emplacements, and the use of tactical and protective wire. It includes night operations, showing harassing and final protective-line firing.)

TF 30 *Elementary Principles of the Recoil Mechanism.* 2 Reels.

(Animated drawings showing the function of the recoil brake and counter-recoil system. General principles of recoil mechanisms only.)

TF 31 *Recoil Mechanism, French 75-mm Gun, Model 1897.* 1 Reel.

(Animated drawings showing detailed operation of the recoil and counter-recoil mechanism of the Puteaux brake.)

SILENT FILMS

TF 2 *Defense Against Chemical Warfare.* 3 Reels.

(This picture shows gas mask drill, training in use of gas masks while firing weapons, and in field exercises. The gas chamber, identification of chemical agents, and individual and group protection against chemical agents also shown.)

TF 3 *Harness and Harnessing* (*horse-drawn artillery*). 3 Reels. (16-mm size also.)
(The nomenclature and function of principal parts of artillery harness, actual harnessing, and the adjustment of harness.)

TF 4 *Driving and Draft* (*horse-drawn artillery*). 4 Reels. (16-mm size also.)
(The pair and team in the fundamental movements, and common errors of driving. Draft over difficult terrain, up and down steep grades, over obstacles, etc.)

TF 5 *Carbon Monoxide—The Unseen Danger.* 1 Reel.
(A Bureau of Mines picture, showing the everyday danger in the home and garage from carbon monoxide gas, the remedial treatment and preventive measures.)

TF 8 *The Combat Engineer Company.* 4 Reels. (16-mm size also.)
(This depicts the combat engineer company, its organization, equipment and employment in combat.)

TF 50 *Common 3-inch Shrapnel.* 1 Reel.
(This shows the determination of site, range, the mil system of angular measurement and height of burst of shrapnel fire.)

TF 57 *155-mm. Recoil System.* (*French, Schneider Howitzer.*) 1 Reel.
(The nomenclature and function of the brake and counter-recoil mechanism. Animated drawings.)

TF 58 *Modern Percussion Fuzes.* 1 Reel.
(The propelling force, force of impact, basic design and types of fuzes. Animated drawings.)

TF 64 *Care of Animals.*
2 Reels (also 16-mm size).
(The proper care, feeding and grooming of the horse or mule. The approved methods of handling, tying on line and treatment after exercise, etc.)

TF 65 *The Rifle Squad, Cavalry, Mounted.*
1 Reel. (16-mm size also.)
(The close and extended order movements of a cavalry rifle squad mounted.)

TF 66 *The Soldier, Mounted, Without Arms.* (Also 16-mm size.)
(This shows the fundamentals of mounted instruction, such as saddling and bridling, adjustment of the bit, the proper manner of mounting, application of aids, etc. It includes slow-motion shots of riding to the walk, trot, canter and jumping obstacles.)

TF 67 *The Construction, Operation and Care of the Internal Combustion Engine.*
3 Reels. (Also 16-mm size.)
(Bureau of Mines picture. It gives the details of the construction of an automobile engine; the purpose and functioning of important parts, and the proper care of the engine. Some scenes are depicted by animated drawings.)

TF 68 *The Spark Plug.*
2 Reels.
(Bureau of Mines picture. This shows the construction, purpose, and functioning of the spark plug. The theory is illustrated by means of animated drawings.)

TF 69 *The Soldier, Instruction, Dismounted with Rifle.*
1 Reel. (Also 16-mm size.)
(This picture, among other things, includes the manual of arms, showing perfect execution and some of the more common errors. Many of the scenes are in slow motion.)

TF 70 *The Soldier, Instruction, Dismounted without Arms.* 2 Reels. (Also 16-mm size.)
(This includes movement often summed up under the phase "the school of the soldier." Many of the scenes are in slow motion.)

TF 71 *The Medical Service, with Infantry in Combat.* 3 Reels. (Also 16-mm size.)
(In this picture is shown how the casualties of an infantry battalion are treated and evacuated from the firing line to medical installations in rear of the division areas.)

TF 72 *The Story of the Gasoline Engine.* 3 Reels.
(A Bureau of Mines picture. The functioning of a modern gasoline engine is well shown in this picture. Animated drawings portray details of construction and operation.)

TF 73 *The Cavalry Rifle Platoon, Its Weapons, Organization and Formations.*
2 Reels. (16-mm size also.)
(This picture gives a demonstration of the various cavalry weapons, the formation of the platoon and some principal drill movements.)

TF 74 *The Cavalry Rifle Platoon, in Mounted Action.*
2 Reels. (16-mm size also.)
(This portrays a simple tactical problem, showing a cavalry platoon acting alone in front of a larger force. Reconnaissance, decisions, and mounted action are demonstrated.)

TF 75 *The Story of the Storage Battery.*
2 Reels.
(A Bureau of Mines picture. This illustrates the theory and functioning of the storage battery and its care.)

TF 76 ***The Story of Automotive Lubrication.***
1 Reel.
(A Bureau of Mines picture. Here is given simple instruction in lubrication, a demonstration of the purpose of lubrication, and common lubrication errors of omission.)

CHAPTER 9

Mechanical Training With the 81-mm Mortar

(INFANTRY SCHOOL TEACHING)

(This chapter outlines a course of mechanical training for the new 81-mm mortar. This course of training has been used with success at The Infantry School and it is offered to the infantry at large with the idea that it may be of help in training in this subject until an authorized course is promulgated by the War Department.—EDITOR.)

SECTION I

INTRODUCTION

1. *GENERAL PRINCIPLES.*—Instruction in mechanical training must be sufficiently thorough and progressive to insure that each member of the unit will be familiar with the weapon, its operation, and its care and cleaning. Nomenclature should be learned by a continual association of the name with the part, and by mentioning the name of any part each time it is touched rather than by learning an abstract list of names. Those undergoing instruction should be divided into small groups, and each group so arranged that the weapon may be seen by all. Each phase of instruction first should be carefully explained and demonstrated, and then followed immediately by a period in which each individual receiving instruction is required to repeat the explanation and demonstration.

The individual undergoing instruction is assisted by the group leader when necessary, and is criticized and checked by the other members of the group.

SECTION II

CHARACTERISTICS AND DESCRIPTION

2. *CHARACTERISTICS.*—The 81-mm mortar is a smooth-bore, muzzle-loading, high-angle-fire weapon. The mortar is assembled into a single unit, while the mount consists of two units—the bipod and base plate. These three units—mortar, bipod, and base plate—form separate loads, each of which is light enough to be carried by one man. A detailed list of the parts and equipment and the essential data pertaining to the 81-mm mortar and mount may be found in Standard Nomenclature List No. A-33.

Table of Condensed Data

Length of mortar, over all	49.8 inches
Weight of mortar	43 pounds
Weight of bypod	46 pounds
Weight of base plate	45 pounds
Total weight of mortar	134 pounds
Weight of sight	3 pounds, 2 ounces
Weight of sight case	12 ounces
Weight of one round, HE shell, light	7 pounds, 3 ounces
Weight of one round, HE shell, heavy	15 pounds, 12 ounces
Range of light shell (approximate)	100 yards to 3280 yards
Range of heavy shell (approximate)	100 yards to 1280 yards
Rate of fire, maximum	30 to 35 rounds per minute
Rate of sustained fire	18 rounds per minute.

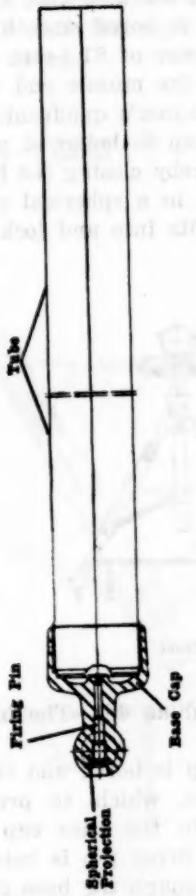

FIGURE 47.—The 81-mm mortar.

3. *DESCRIPTION.—a.* The mortar (Figure 47) consists of the barrel, the base cap, and the firing pin.

(1) The barrel is bored smooth and carefully finished to an inside diameter of 81.4-mm. A flat surface is machined on top of the muzzle end of the barrel to serve as a seat for a gunner's quadrant.

(2) The base cap is hollowed and threaded to screw on the barrel, thereby closing the breech end of the mortar. It terminates in a spherical projection, flattened on two sides, which fits into and locks in the socket of the base plate.

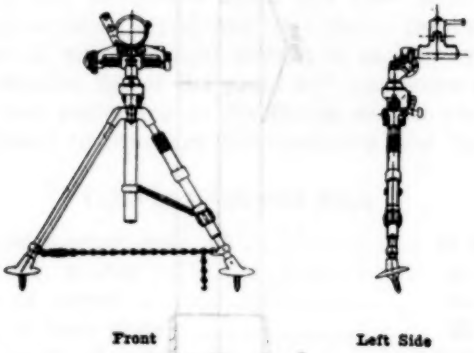

FIGURE 48.—The bipod.

(3) The base cap is bored and threaded axially to receive the firing pin, which, to prevent gas leakage, is screwed tightly into the base cap against a shoulder. When in place the firing pin is held stationary, with its point protruding through the base cap into the tube.

b. The bipod (Figure 48) consists of the leg, elevating mechanism and traversing mechanism assemblies.

(1) The leg assembly (Figure 49) consists of two tubular steel legs mounted on the trunnions of the gear case by a compass joint. The legs terminate in feet with

spikes. The spread of the legs is limited by an adjustable chain fastening. A spring is interposed between the right hand end of the chain and the right leg to relieve the legs of shock during firing.

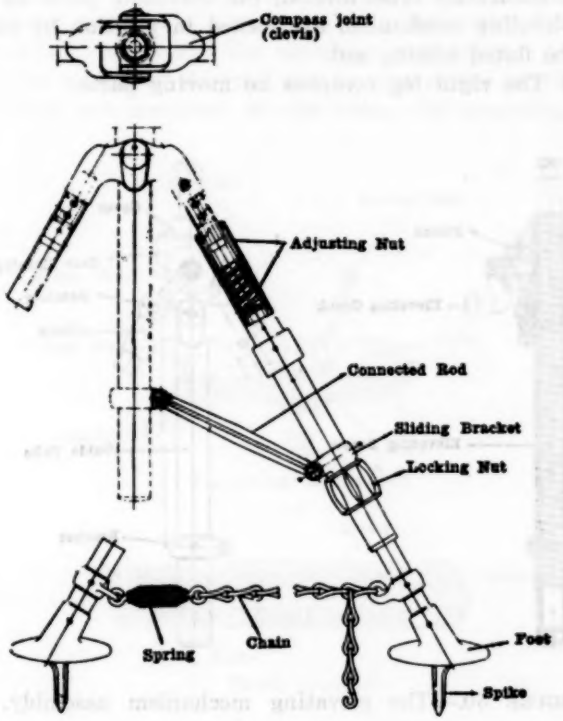

FIGURE 49.—The leg assembly.

(a) The left leg carries a cross-leveling mechanism which consists of a sliding bracket connected with the guide tube by a connecting rod. A movement of the sliding bracket up or down is transmitted to the mortar through the connecting rod, the elevating mechanism

assembly and the traversing mechanism assembly, causing a corresponding movement of the mortar. Thus the mortar may be cross-leveled by moving the sliding bracket. The leveling process can be completed accurately by rotating a knurled adjusting nut on the upper part of the leg. When accurately cross-leveled, the moveable parts of the cross-leveling mechanism are locked in position by rotating the fluted locking nut.

(b) The right leg contains no moving parts.

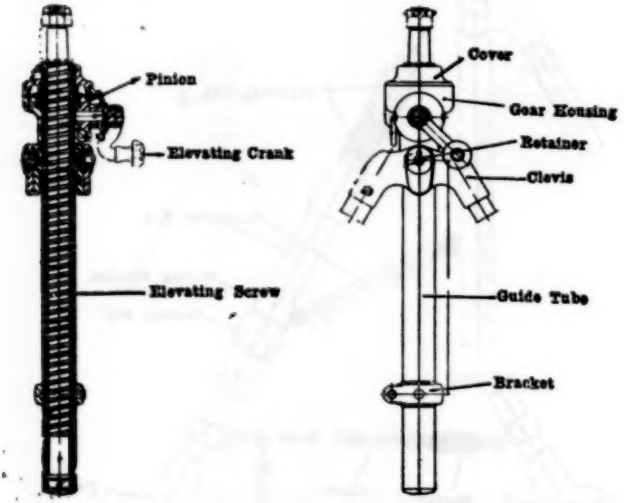

FIGURE 50.—The elevating mechanism assembly.

(2) The elevating mechanism assembly (Figure 50) consists of a vertical screw moving in a guide tube. It is actuated by a bevel gear and pinion contained in the gear housing. The gear and pinion are moved by the elevating crank. The top cover of the gear case contains an oil fitting for oiling the elevating screw, gear and pinion.

(3) The traversing mechanism assembly (Figure 51) consists of the traversing mechanism, shock absorbers, and mortar clamp.

(a) The traversing mechanism consists of a horizontal screw operating in a yoke and actuated by a traversing hand wheel. The yoke, which provides the bearings for the traversing screw, also serves as a connection between the mortar clamp and the elevating mechanism. A level vial and a tapered dovetail slot to receive the bracket of the sight are mounted on the yoke. By operating the

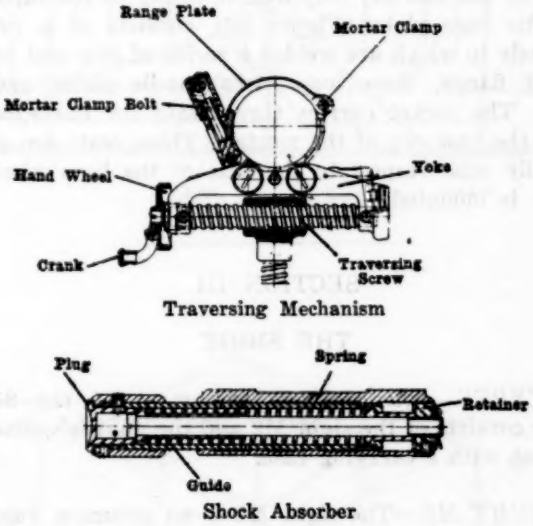

FIGURE 51.—The traversing mechanism assembly.

traversing mechanism, the mortar may be traversed 130 mils at 45 degrees, 145 mils at 60 degrees, and 210 mils at 90 degrees elvation.

(b) The shock absorbers are designed to stabilize the mortar and mount during firing. They permit movement between the yoke and the clamp assembly and are count-

ered by the resistance of two coil compression springs which are mounted in the shock absorber retainers of the saddle.

(c) The mortar clamp, by means of which the barrel is clamped to the bipod, is in two sections. The lower section, called the saddle, consists of the lower half of the clamping collar, and two shock absorber retainers with locking screws. The upper section consists of the upper half of the clamping collar. The two halves of the clamping collar are hinged and can be locked tightly together by the clamp bolt. When so secured about the barrel of the mortar, they lock it firmly to the bipod.

c. The base plate (Figure 52) consists of a pressed steel body to which are welded a series of ribs and braces, a front flange, three loops, two handle plates and the socket. The socket carries three seats for the spherical end of the base cap of the mortar. These seats are placed vertically with respect to the axis of the bore when the mortar is mounted.

SECTION III

THE SIGHT

4. *TYPES.*—The sighting equipment of the 81-mm mortar consists of the sight M2 and the gunner's quadrant M1, each with a carrying case.

5. *SIGHT M2.*—The sight M2 is an accurate, ruggedly constructed instrument used to lay the mortar for direction and elevation (see Figure 53). The sight consists of the bracket (1), body (2), and head (3) assemblies. It provides the means for mounting the sight, for laying in direction and elevation, for cross-leveling the mount, and for determining mask clearance.

a. The mechanism for mounting consists of a wedge-shaped bracket (1) and a spring latch (4). The sight

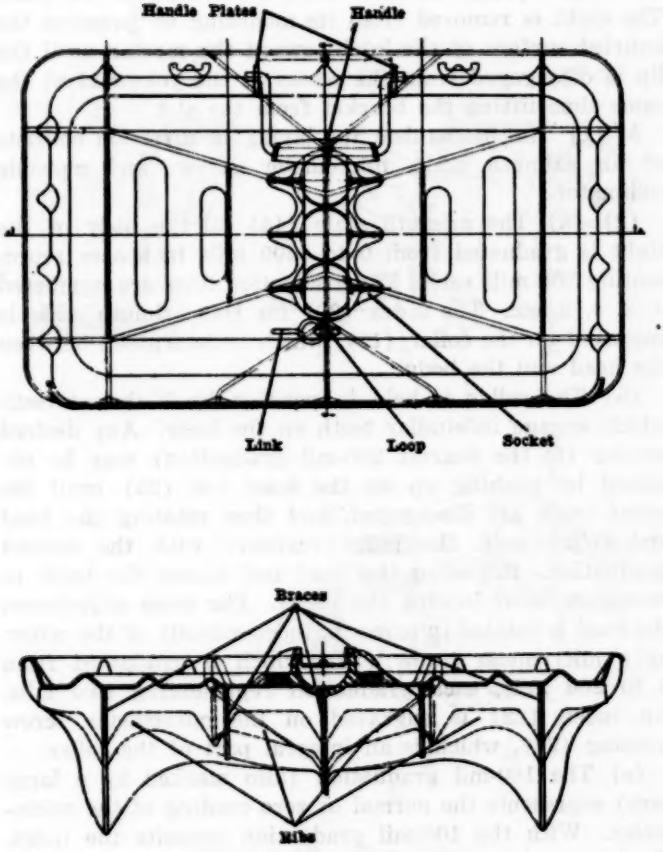

FIGURE 52.—The base plate.

is rigidly mounted by inserting the bracket in the dovetailed slot on the yoke until the lip (5)—on the end of the latch—springs out into the milled recess of the yoke. The sight is removed from its mounting by pressing the knurled surface of the latch toward the mortar until the lip is disengaged from the recess in the yoke and at the same time lifting the bracket from the slot.

b. (1) The mechanism for laying in direction consists of an azimuth scale, micrometer screw, and movable collimator.

(2) (a) The azimuth scale (14) on the body of the sight is graduated from 0 to 6400 mils in spaces representing 200 mils each. The graduation lines are numbered 0, 2, 4, 6, etc. The index (20) for this azimuth scale is engraved on the collar (12), which is interposed between the head and the body.

(b) The collar is held in position by V-shaped teeth which engage in similar teeth on the body. Any desired setting (to the nearest 200-mil graduation) may be obtained by pushing up on the head nut (25) until the collar teeth are disengaged, and then rotating the head and collar until the index registers with the correct graduation. Releasing the head nut causes the teeth to re-engage, thus locking the collar. For close adjustment the head is rotated in azimuth, independently of the collar, by a micrometer screw (15), which is graduated from 0 to 200 mils, each graduation representing two mils. An index (22) is engraved on the micrometer screw housing (26), which is an integral part of the collar.

(c) The 100-mil graduation (also marked by a large zero) represents the normal or zero reading of the micrometer. With the 100-mil graduation opposite the index, the head my be rotated 100 mils to the right and left. (Although the screw may be turned a few mils in excess of 100 in either direction it should not be turned past the small zero.)

(3) A collimator (9) is attached to the movable head. This collimator, which is provided with a vertical line,

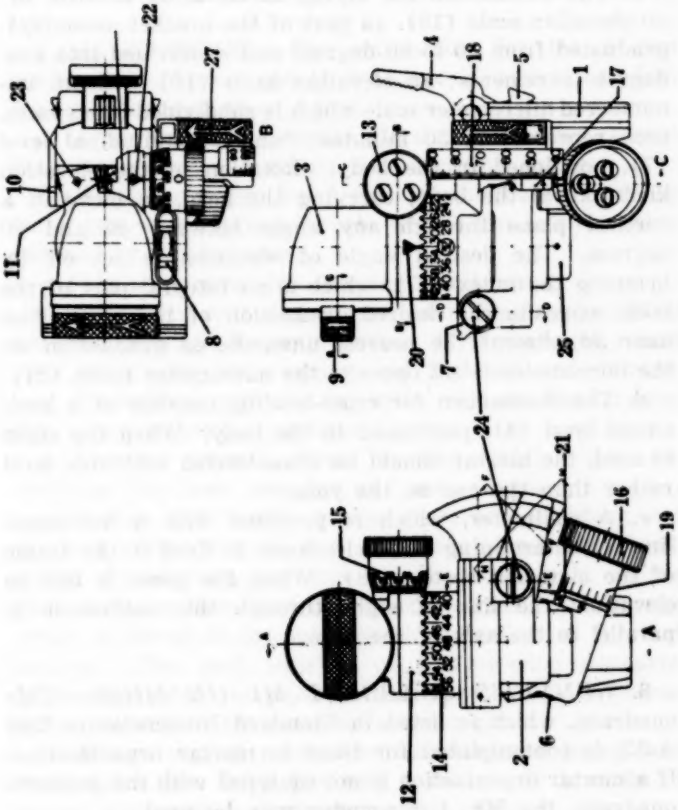

FIGURE 53.—The sight.

A, B, and C show three views of the sight.

can be moved in a vertical plane for picking up aiming points.

c. The mechanism for laying in elevation consists of: an elevation scale (18), (a part of the bracket assembly), graduated from 40 to 90 degrees and subdivided into one-degree increments; an elevation knob (16) with an unnumbered micrometer scale which is subdivided into spaces, each representing 30 minutes; *and a longitudinal level (7), positioned in the body. Rotation of the elevation knob causes the body, carrying the head, to move in a vertical plane through any angle between 40 and 90 degrees. The desired angle of elevation is set off by bringing the index (17), which is an integral part of the body, opposite the desired graduation of the scale. For finer adjustment the nearest unnumbered graduation on the micrometer is set opposite the micrometer index (21).

d. The mechanism for cross-leveling consists of a horizontal level (8), positioned in the body. When the sight is used, the mortar should be cross-leveled with this level rather than the one on the yoke.

e. A collimater, which is provided with a horizontal line for determining mask clearance, is fixed to the frame of the elevation sector (18). When the piece is laid in elevation, the line of sight through this collimator is parallel to the axis of the bore.

6. *GUNNER'S QUADRANT M1 (IN MILS).*—This quadrant, which is listed in Standard Nomenclature List A-33, is contemplated for issue to mortar organizations. If a mortar organization is not equipped with the gunner's quadrant, the Mk. I clinometer may be used.

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* A later design of this sight contemplates an elevation scale and micrometer scale graduated in mils instead of degrees and minutes.

SECTION IV

ACCESSORIES AND AMMUNITION

7. *ACCESSORIES.*—The accessories for the 81-mm mortar, which are listed in Standard Nomenclature List No. A-33 consist of—

a. Accessory chest, carries all the accessories, except the sponge staff and ammunition-carrying harness.

b. Chamber cleaning brush, to clean the fouling from the firing pin vent. It is a bristle brush, the bristles being retained by twisted wire.

c. Fabric envelope, for carrying small parts.

d. Firing pin vent cleaning tool, for cleaning the firing pin vent when it becomes fouled. It is made of round steel stock with the cleaning end flattened and pointed.

e. Single head wrench, 1½-inch, used on the traversing screw adjusting bushing.

f. Spanner wrench, used in disassembling and assembling the gear case top and side covers.

g. Sponge (M2) and sponge staff, for swabbing out the bore of the mortar. It is composed of a bronze head, which threaded on one end for the attachment of the staff, a brass tube, and the sponge carpet. The sponge carpet is sewed to the tube, which is perforated for that purpose. The staff consists of two wooden supports. This combination of parts is held together by a bronze collar secured to the head by a taper pin.

h. Muzzle cap, to cover the muzzle of the barrel and protect the bore from dirt and moisture. It is made of cotton duck with a draw string and chain.

i. Ammunition-carrying harness, listed in Standard Nomenclature List A-33. It is contemplated for issue to mortar organizations.

j. Other accessories: lubricating gun, oil can, oiler, punch, screw driver, and tool roll. Their use is indicated by their names.

8. *AMMUNITION.—a. General.*—Ammunition for 81-mm mortar is classed as semifixed ammunition, since the propelling charge is in increments and is adjustable for zone firing. As with any semifixed ammunition, it is loaded into the mortar as a unit in one operation. It is issued in complete rounds, each round packed in a fiber container with the shell fused and with the propelling charge in place.

b. Types.—Three general types of shell are provided: the high explosive shell, the smoke shell (under development), and the practice shell. All are stream-lined in profile. Each tapers toward the tail which terminates in a tubular, perforated cartridge container. Metal fins, which are soldered to the cartridge container, assist in preserving stability in flight. Grooves between the vanes of the fin assemblies provide the means for holding the propelling charge increments. All types are adapted for the M45 point-detonating fuze, which is described in *c* below, and are issued assembled with the fuze and an ignition cartridge (M3) (Figure 54) in place.

(1) *The high explosive shell (light) M43 (Figure 54)* weighs 7 pounds, 3 ounces, and contains a bursting charge of about 1 pound of TNT. It is biogival in shape. Near the head is a grooved bourrelet which is machined to fit the bore of the mortar. When packed, the bourrelet is covered with oiled paper. The propelling charge consists of an ignition cartridge (M3) and six powder increments. The cartridge is similar in appearance to a 12-gauge shot gun shell and is loaded with ballistite. The powder increments consists of flake ballistite sealed in semi-spherical celluloid cups. The shell is painted yellow and is stencilled in black as follows:

81 M & 3 TM
TNT
SHELL M 43
AMM. Lot.....

This shell has a minimum range of about 100 yards and a maximum range of approximately 3280 yards; its

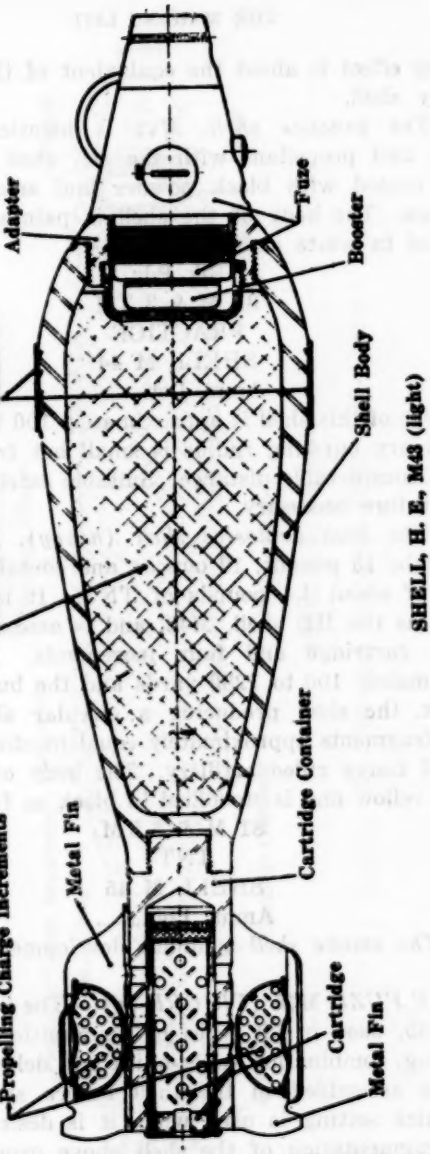


FIGURE 54.—The high explosive shell, M43 (light).

bursting effect is about the equivalent of the 75-mm HE artillery shell.

(2) *The practice shell, M44* is identical in profile, weight, and propellant with the HE shell (light) M43, but is loaded with black powder and smoke producing substance. The body of the shell is painted blue and is stencilled in white as follows:

Blk Pdr.
81 M & 3 TM
PRACTICE
SHELL M 44
Amm. Lot.....

The range of this shell is approximately 100 to 3280 yards. Its ordinary bursting radius is small but fragments may fly to a considerable distance. Suitable safety precautions are therefore necessary.

(3) *The high explosive shell (heavy), M45 (Figure 55)* weighs 15 pounds, 12 ounces, and contains a bursting charge of about 4.4 pounds of TNT. It is about twice as long as the HE shell, M43, and is assembled with an ignition cartridge and four increments. Its range is approximately 100 to 1280 yards and the bursting radius is great, the shell producing a circular sheaf of very deadly fragments approximately equal in effect to the HE shells of heavy rifled artillery. The body of the shell is painted yellow and is stencilled in black as follows:

81 M & 3 TM
TNT
SHELL M 45
Amm. Lot.....

(4) *The smoke shell* is under development.

9. *THE FUZE M45 (FIGURE 56).*—The 81-mm mortar fuze, M45, used in all types of ammunition, is a point-detonating, combination super-quick and delay-action fuze, which is assembled in the shell before shipment. The super-quick setting is used when it is desired to obtain quick fragmentation of the shell above ground, whereas

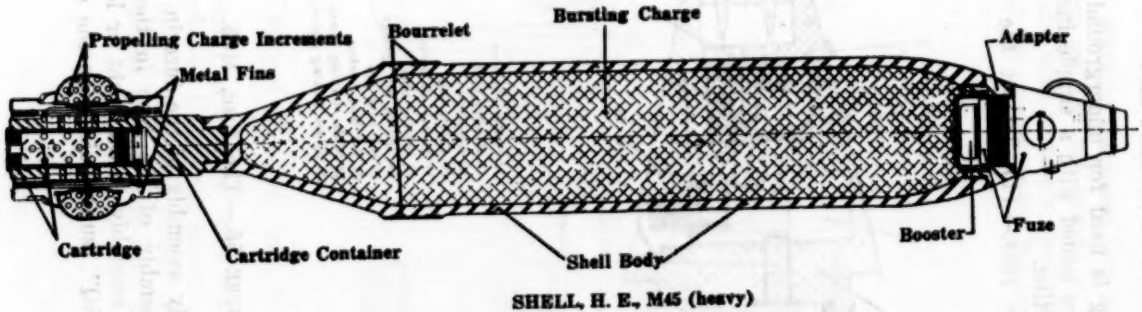
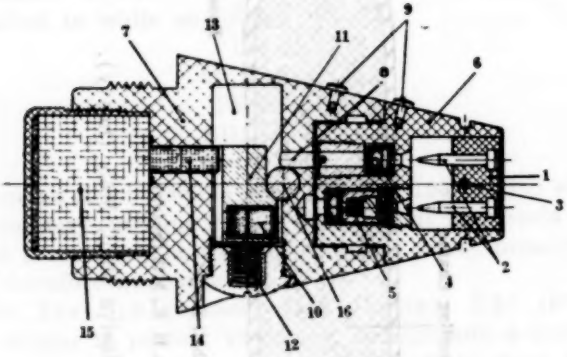


FIGURE 55.—The high explosive shell, M45 (heavy).

the delay setting is used for underground action. Some types of shell are issued with a simple instead of a combination fuze action.

a. Setting the fuze.—(1) To set the fuze, hold the



1 Striker
2 Firing pins
3 Shear wire
4 S. Q. Primer
5 Delay primer
6 Fuze head
7 Body
8 Flash hole
9 Indices
10 Detonator
11 Slider
12 Slider spring
13 Slider chamber
14 Booster lead
15 Booster
16 Safety pin
17 Safety pin spring
18 Setting pins
19 Setting pin springs
20 Set back pin
21 Set back spring
22 Slider locking sleeve
23 Slider locking sleeve spring

FIGURE 56.—The fuze, M45.

projectile and body assembly of the fuze in the left hand and the head assembly of the fuze in the right hand. Revolve the head assembly to the right or left until "D" (delay) or the "SQ" (super-quick) on the outer face of

the fuze comes opposite the index line on the fuze body. The fuze is then set, but not armed.

(2) (a) As the head assembly revolves to the right or left, the setting pins move under the circular groove in

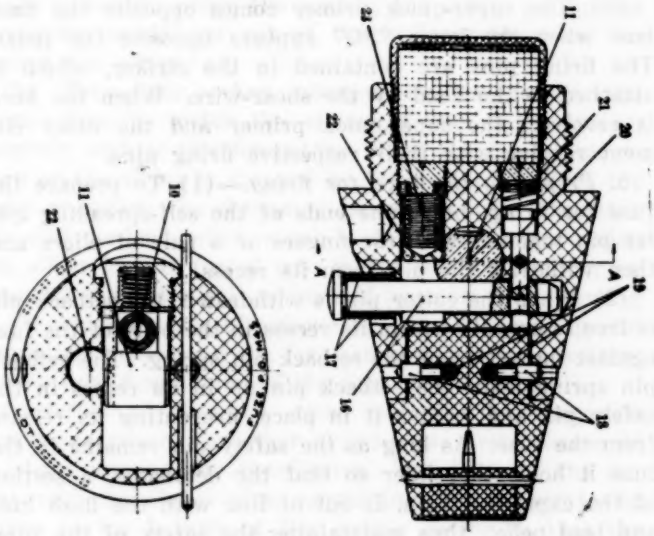


FIGURE 56.—The fuze, M45.

the body assembly until they come opposite a recess in the circular groove. Under the action of the setting pin springs, the setting pins are forced outward to engage in the recesses and prevent the head assembly from re-

volving in the body assembly. The letter "D" or letters "SQ" will now be opposite the index in the fuze body, depending on whether the fuze has been set for delay or super-quick action. When changing the setting from delay to super-quick action or vice versa, the setting pins are forced inward and out of their recesses by the rotation of the fuze head and will re-engage when the letter "D" or letters "SQ" again come opposite the index.

(b) The super-quick primer comes opposite the flash hole when the letter "SQ" appears opposite the index. The firing pins are contained in the striker, which is attached to the head by the shear-wire. When the head is revolved, the super-quick primer and the delay element revolve with their respective firing pins.

b. Preparing the fuze for firing.—(1) To prepare the fuze for firing, bring the ends of the self-spreading cotter pin together with the fingers or a pair of pliers and then withdraw the pin from its recess.

(2) When the cotter pin is withdrawn, the setback pin is free to operate within its recess in the body of the fuze against the action of the setback pin spring. The setback pin spring holds the setback pin up in its recess in the safety pin and retains it in place, preventing its release from the fuze. As long as the safety pin remains in the fuze it holds the slider so that the detonator, a section of the explosive train, is out of line with the flash hole and lead pellet, thus maintaining the safety of the fuze.

c. Action of the fuze in firing.—(1) The fuze is outomatically armed in firing. While it is necessary, as a precautionary measure, for the loader to keep the thumb of the right hand on the head of the safety pin until it disappears into the muzzle, the fuze is not fully armed until the projectile leaves the muzzle in flight.

(2) When the projectile reaches the base of the mortar, the primer in the ignition cartridge is detonated by the firing pin. The primer ignites the propelling charge (cartridge and increments), which forces the projectile violently upward. Although the setback pin is capable

of movement in its recess, since it is no longer held by the cotter pin, inertia prevents it from moving upward initially as fast as the other portions of the projectile. This action compresses the setback pin spring and causes the setback pin to clear the recess in the safety pin. Thus, the safety pin is freed, and is forced outward by the action of the compressed safety pin spring until it comes in contact with the inner wall of the barrel. As soon as the projectile clears the muzzle, the safety pin spring forces the safety pin out of the body of the fuze, releasing the slider.

(3) The slider, when released by the safety pin, moves laterally under the action of the slider spring, carrying with it the detonator. When the lateral movement of the slider is stopped by the interior wall of the slider chamber, the detonator is in line with the flash hole and the lead pellet, which leads to the booster pellet. The slider lock is forced into the recess in the slider by means of the slider lock spring and prevents the unarming of the slider in case of oblique impact. All priming and detonating elements of the fuze are now in proper position for the final functioning of the fuze upon impact.

d. Action of the fuze upon impact.—The projectile strikes the ground, or other object, nose first because of its shape and weight distribution. The force of the impact cuts the shear wire, permitting the striker to be driven to the bottom of the striker cavity so that the firing pins penetrate the super-quick primer and the delay element, causing them to function. If the super-quick primer is opposite the flash hole, the explosive train is ignited instantly. If the delay element is opposite the flash hole the explosive train is ignited in about one-twentieth of a second. Immediately upon ignition the explosive train ignites the booster pellet which in turn detonates the bursting charge of the shell.

SECTION V

DISASSEMBLING, ASSEMBLING, MOUNTING AND DISMOUNTING

10. *DISASSEMBLING AND ASSEMBLING.*—The only part of the mortar which may be removed by the mortar company personnel is the firing pin. This has a slotted head. The screw driver provided in the accessories chest should be used to unscrew the firing pin from the base cap. If the inner edge of the drilled recess in the spherical end of the base cap has been peened by recoil against the socket during firing, smooth the peened edge with a fine file. Replace the firing pin by screwing it tightly into position, after slightly oiling the threads. The firing pin should be removed only when it is necessary to clean or replace it.

11. *MOUNTING AND DISMOUNTING.—a. The mortar emplacement.*—The mortar may be fired with the base plate either on top of the ground or in a pit. When time does not permit digging in the base plate, the morter may be fired, with the light shell only, by merely placing the base plate on top of the ground with its long axis perpendicular to the direction of fire. In this case the base plate is anchored by the recoil of the first two or three rounds fired. The use of a pit for the base plate gives greater accuracy of fire because it permits the base plate to be placed with its short axis more nearly perpendicular to the axis of the bore. This gives a greater bearing surface to the base plate. It also assists in maintaining the perpendicular position of the long axis of the base plate. Consequently, it is always preferable, when time permits, to dig a pit for the base plate. A pit is necessary when firing the light shell at long range with heavy charges and when firing the heavy shell. Whether the base plate is placed on the ground or a pit is dug, the direction of fire will first be established. This is done by

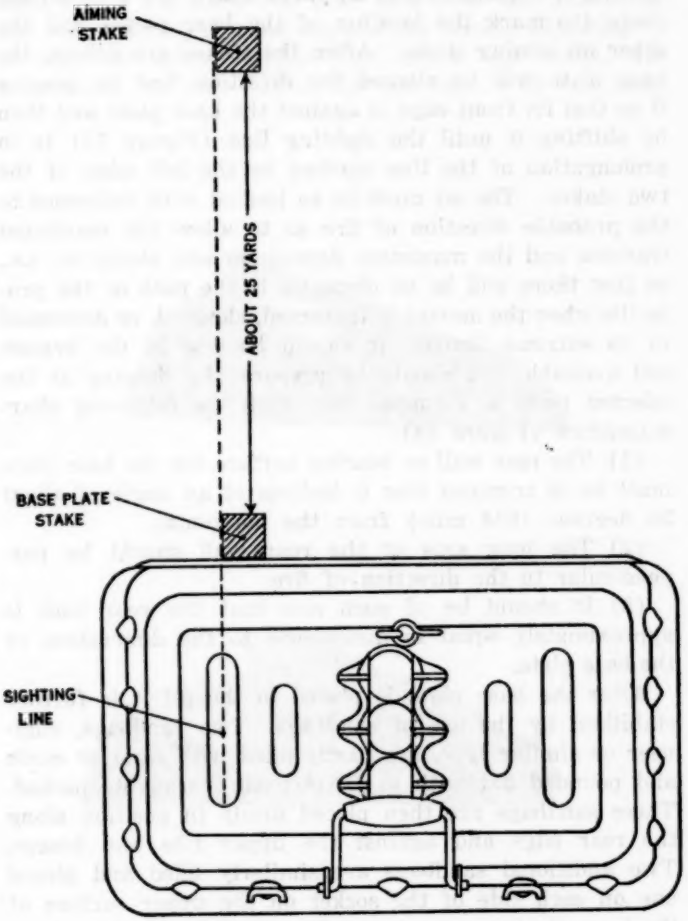


FIGURE 57.—Alignment of base plate.

driving two stakes, about 25 yards apart, one a base-plate stake (to mark the location of the base plate) and the other an aiming stake. After the stakes are driven, the base plate will be aligned for direction first by placing it so that its front edge is against the base plate and then by shifting it until the sighting line (Figure 57) is in prolongation of the line marked by the left edge of the two stakes. The pit must be so located with reference to the probable direction of fire as to allow the maximum traverse and the maximum depression and elevation; i.e., so that there will be no obstacles in the path of the projectile when the mortar is traversed, elevated, or depressed to its extreme limits. It should be dug in the firmest soil available. It should be prepared by digging at the selected point a V-shaped hole with the following characteristics (Figure 58):

(1) The rear wall or bearing surface for the base plate must be so trimmed that it inclines at an angle of about 30 degrees (534 mils) from the horizontal.

(2) The long axis of the rear wall should be perpendicular to the direction of fire.

(3) It should be of such size that the rear wall is approximately equal in dimensions to the dimensions of the base plate.

After the base plate is placed in the pit it is further stabilized by the use of sandbags. Two sandbags, engineer or similar type, are partly filled with sand or earth and pounded flat with a shovel until thoroughly packed. These sandbags are then placed firmly in position along the rear edge and against the upper ribs and braces. Two additional sandbags are similarly filled and placed one on each side of the socket on the upper surface of the base plate.

b. To mount the mortar.—With the direction of fire established and the base plate aligned as in paragraph *a*, above, the gunner, No. 1, in front of the base plate and facing it, places the feet of the bipod on the ground, mortar clamp to the rear, about a yard in front of the

base plate. He holds the gear case with the left hand, and with the right hand unrolls the chain, adjusting it to limit the spread of the legs (about one yard). He then hooks the free end to the left leg. With the right

(a)

(b)

FIGURE 58.—The base plate pit.

hand he opens the legs of the bipod to a distance of about one yard, loosens the fluted locking nut on the left leg, moves the sliding bracket until the guide tube is vertical, and tightens the fluted locking nut. Next, supporting

the bipod against his legs, he places the fingers of both hands under the mortar clamp and lifts up the saddle, unlocking it from the elevating crank. Then holding the gear case with his left hand, he moves in rear of the left leg and with his right hand under the saddle lifts the clamp to receive the mortar. The assistant gunner, No. 2, inserts the spherical end of the base cap into the center indentation of the socket and rotates the mortar 90 degrees until the flattened surface near the muzzle is uppermost and the mortar and base plate are locked together. He then grasps the rim of the muzzle with his left hand and with his right hand uncrews the clamp bolt, opens the mortar clamp, places the barrel in the saddle held by the gunner, No. 1, and clamps it firmly into position, with the upper edge of the clamp about one-third the length of the barrel from the muzzle. The gunner then receives the sight from the corporal, mounts it on the mortar and centers the elevating screw. He then sets off an elevation of 62 degrees on the sight, and directs No. 2 to move the bipod legs until the bubble in the longitudinal level is centered. The legs will be moved no farther to the rear than the vertical. If sufficient elevation to center the bubble cannot be obtained by the movement of the legs, the additional elevation will be obtained by means of the elevating crank.

c. To dismount the mortar.—The gunner, No. 1, removes the sight and hands it to the corporal, who replaces it in its case. The gunner then turns the elevating crank until the elevating screw is returned completely into the guide tube and the elevating crank is turned downward. He then centers the traversing screw. Both the gunner, No. 1, and assistant gunner, No. 2, continue to dismount the mortar by reversing the operation of mounting.

SECTION VI

INSPECTION, PRECAUTIONS BEFORE AND DURING FIRING, MISFIRES

12. *INSPECTION.*—The following instructions with reference to inspection will be carefully observed by all concerned.

Points to be inspected in order of inspection	*Points to observe*
a. Mortar	*a.* Note general appearance and cleanliness of the bore. Examine condition of quadrant seat.
b. Firing pin	*b.* Examine for fouling, rust, or foreign substance on the point.
c. Bipod	*c.* Note general appearance. Oil fittings should be encircled by a red ring. All moving parts should be properly lubricated.
(1) Elevating mechanism.	(1) Elevate and depress the mortar. The mechanism should operate without binding, excess play, or undue backlash.
(2) Traversing mechanism.	(2) Traverse the mortar. The mechanism should operate smoothly without binding or undue backlash.
(3) Cross-leveling mechanism.	(3) Operate the mechanism. It should function properly and without excess play to cross-level the traversing mechanism. The level vial should be clear, and index marks for centering the bubble, distinct.
d. Base plate	*d.* Note general appearance. The edges of the free recesses in the socket should be smooth and without burr.
e. Sight and its mounting	*e.* Note whether the operating condition of the sight or rigidity of its mounting have been impaired.

13. *PRECAUTIONS BEFORE FIRING.*—*a.* The mortar must be properly mounted (see paragraph 11).

b. The mortar must be locked to the base plate.

c. The clamp bolt must be secure.

d. The mortar must be cross-leveled and the locking nut secure.

e. The chain must be adjusted to limit the spread of the bipod legs.

f. The bore must be swabbed out before firing.

g. Each shell must be clean, particularly the bourrelet.

14. *PRECAUTIONS DURING FIRING.*—*a.* From time to time check to be sure that the clamp bolt and fluted locking nut are tight.

b. Swab the bore after *every* ten rounds.

c. Check frequently to see that base plate and bipod positions are safe for firing.

d. For each different elevation used, check fixed collimator to determine if fire will clear the mask.

15. *MISFIRES.*—*a. Causes.*—A misfire is a shell that has been loaded into the barrel of the mortar but has failed to fire because the propelling charge did not function. The shell therefore remains in the mortar until it is removed by hand. A misfire may result from one or more of the following causes—

(1) Defective cartridge.

(2) Bent or crooked cartridge container.

(3) Defective or damaged firing pin.

(4) Firing pin fouled or obstructed by fragments from previous rounds.

(5) Lack of percussion due to:

(a) Fouled bore.

(b) Excess oil in bore.

(c) Cartridge not fully inserted in container.

b. Removal of round after misfire.—(1) When a misfire occurs, the mortar crew waits ten minutes before removing the shell in order to avoid accident caused by a

possible delayed fire. Then the assistant gunner, No. 2, unscrews the clamp bolt just far enough to allow the mortar to be rotated and places his right leg behind and bracing the right leg of the mount. The ammunition handler, No. 3, rotates the mortar until the spherical end of the base cap is unlocked from the base plate. The assistant gunner, No. 2, then reclamps the barrel and places his right hand, palm up, under the barrel near the muzzle, and his left hand, palm down, on top of the barrel. Care is taken that no part of either hand is in front of the muzzle.

(2) The ammunition handler, No. 3, lifts the base of the mortar until the shell slides slowly toward the muzzle. As soon as the shell has started forward, *and not before*, the assistant gunner, No. 2, places one or more fingers of his right hand over the muzzle and stops the shell as the tip of the fuze reaches the muzzle. He then ascertains the position of the safety pin and places a finger over the head of the safety pin as a precautionary measure while he removes the unfired round from the mortar, and passes it to the ammunition handler, No. 4, who replaces the cotter pin and inspects the shell to determine the cause of misfire. The ammunition handler, No. 3, inspects the firing pin to see that it is clean and tightly screwed into the base cap and replaces the spherical end of the base cap in the socket. The assistant gunner, No. 2, unclamps the mortar. The ammunition handler, No. 3, rotates the mortar to lock it into the base plate. The assistant gunner tightens the clamp bolt and sponges out the bore. Firing is then resumed.

SECTION VII

CARE AND PRESERVATION

16. *INSTRUCTIONS.—a Detailed instructions.*—The detailed instructions as to the care and preservation of the 81-mm mortar may be found in Standard Nomenclature List A-33.

b. Mortar.—(1) The importance of keeping the bore clear of powder fouling and other foreign substance cannot be overstressed. After each firing period, the bore should be thoroughly cleaned with a solution made by dissolving one-half pound of soda ash or one pound of sal soda in one gallon of water, using the sponge for swabbing purposes. Wipe dry, and then oil the bore with a thin coating of light, class "A" lubricating oil. It will be necessary to improvise swabs of white cotton waste or other soft material for drying and applying the oil.

(2) Remove the firing pin and thoroughly clean it with the solution referred to in subparagraph (1). Wipe thoroughly dry, oil lightly, and reassemble.

(3) Should the quadrant seat on the muzzle end of the barrel show a burred condition, remove the burrs with a smooth file and coat the seat with light, class "A" lubricating oil.

c. Mount.—(1) The bipod must be kept in serviceable condition. To do this, proper attention must be given to cleaning, lubrication, and the repair or replacement of loose or broken parts. All bearing surfaces and screw threads must be kept clean and well oiled. Likewise the exterior parts must be kept clean.

(2) Gasoline is furnished by the Ordnance Department for cleaning purposes.

(3) When the bipod is to be stored, or is likely to remain unused for any appreciable length of time, all bright and unpainted surfaces will be protected with a coat of heavy rust preventive compound.

d. Lubricating instructions.—(1) The various lubri-

cants, and cleaning and preserving materials issued by the Ordnance Department are described and their use prescribed in TR 1395-A.

(2) For oiling the vital parts of the bipod, seven flush type fittings have been provided. They are located as follows: one each in the connecting rod bracket, gear case top cover, rear half of the left leg clevis, and the leg clevis retainer, rear; and three in the yoke. Light class "A" lubricating oil is inserted through these fittings when oiling is required, by means of the lubricating gun.

(3) Other moving parts, such as the collar, eyebolt pivot, traversing crank pivot, and the elevating crank knob, also should have light, class "A" lubricating oil applied as necessary.

e. Paint.—For detailed information regarding the removal of old paint, cleaning and preparation for painting, preparing new paint, application and kinds of paints to different surfaces, brushes, slushing oils, abrasives, etc., see TR 1395-A.

f. Protection and cleaning of material effected by gas.—(1) (a) For material which is in constant danger of gas attacks, whether from gas clouds or gas shells, care should be taken to keep all bright parts of the mortar, mount, and accessories well coated with oil.

(b) Sights and all instruments also should be covered with oil and protected with covers when not in actual use, care being taken that the oil does not come in contact with any glass or find its way into the interior of the instrument.

(c) Fuzes of shells which have been removed from their containers should be wiped over with oil as soon as possible and protected with a cover.

(2) All bright parts of mortars and mounts, together with all accessories and spare parts exposed to gas, must be cleaned and wiped dry as soon as possible after exposure (in any case within 24 hours), after which they should be thoroughly coated afresh with oil. The same applies to all ammunition still in the mortar position.

Ammunition which for any reason has not been oiled must be cleaned and oiled. It is desirable to expend it as soon as possible.

(3) (a) Any parts of the mortar, material, or equipment which have come in contact with mustard gas must be thoroughly disinfected. Detailed instructions for this disinfection are found in Standard Nomenclature List A-33.

(b) The delicate parts of the apparatus, such as sighting apparatus and glasses, which would be injured by chloride of lime or other disinfecting material, must be cleaned by dry polishing with rags. After this operation the rags should be buried; they must not be burned.

CHAPTER 10

Infantry Around the World

BRITISH INFANTRY

Some idea of the direction which the reorganization of the British infantry is taking can be gleaned from Captain B. H. Liddell Hart's "The Changing Army" in *The Fighting Forces* of February, 1937.

He writes: "Early in 1936 further decisions were taken towards the modernization of the infantry. They involved the complete mechanization of its first-line transport, * * * while even the officers' chargers were to be replaced by light cars or motorcycles.

"There was also a decision on the new organization." This organization was somewhat altered during the course of the year.

The author's indications on the new organization are summarized below—

The rifle battalions are to consist of a platoon of four mechanized mortars and four homogeneous rifle companies, each with twelve of the new *Bren* light machine guns (21-pound Czechoslovakian arm replacing Lewis gun). There is to be one of these guns in each seven-man group. Presumably there will be three platoons each of four groups in the company.

Machine-gun battalions are to be divisional and corps troops (in the experiments of 1935 and early in 1936 the battalion was in the brigade, along with three rifle battalions). The machine-gun battalion is to have only two machine-gun companies, instead of three, with 16 guns

in each—a battalion total of 32 in place of the former 36. These companies are equipped with low armored vehicles from which the gun can be fired.

The machine-gun battalion also will have an antitank company of three platoons of four 2-pounder (40-mm) quick-firing guns hauled by a special truck. The intended use of the portable antitank rifles was responsible for reducing the antitank company from four to three platoons. A new addition to the machine-gun battalion is the mechanized scout company of three platoons equipped with lightly armored fast trucks enabling them to push forward boldly on reconnaissance.

(This battalion looks like a dynamic and powerful unit; a sort of a tankette—antitank—scouting—reconnaissance—reinforcing outfit.)

The division will probably have two machine-gun battalions, three brigades each of three rifle battalions, and a divisional reconnaissance element, "strong in automatic weapons and mobility, which should be capable not merely of discovering the enemy's whereabouts, but penetrating his screen and probing his dispositions, besides seizing points ahead of the advancing columns."

Captain Liddell Hart comments on this division: "The new model organization—with its three infantry brigades of smaller size and its heavier infantry weapons under division control—is expected to improve manageability and to diminish road congestion, while allowing a more flexible power of concentrating extra fire support at the vital points."

There is always a great danger in this transfer of supporting weapons to higher echelons—one which the British may now be risking—that is, the danger of never getting supporting fire where it is needed *when it is needed.* This is particularly true in battle when intercommunication with higher echelons often is interrupted or entirely lost for long periods.

Light infantry must be light enough and flexible enough to maneuver, but it also needs strong fire support. Where to compromise is the problem.

In the British Army, the brigade corresponds to the regiment in most other armies. In France and Italy, there is still a strong tendency to give the regimental echelon its own supporting weapons—heavy machine guns, antitank guns, and howitzer or mortar accompanying guns.

The British experiment is a long step toward increasing mobility and the flexibility of fire. Only war can prove whether it is a correct step or an overstep.

ANTITANK RIFLE IN BRITISH ARMY

The United Services Review (British) of January 7, 1937, reports that most units of the British army should now be in possession of the new "Boys" antitank rifle* as well as a supply of antitank guns.

"It is said that the Germans have a very good type of antitank gun, and that they are equipping their divisions with 60 of these antitank guns, as compared with the 30 or so which the French consider necessary. At the moment we are striking the happy medium in antitank guns with 36 per division, but * * * the organization of the machine-gun battalions is being reconsidered. ...

"It is understood ... that the General Staff have decided to give each platoon an antitank rifle, which will be carried on the platoon transport. * * * It seems a fair assumption ... that ultimately our total antitank armament will be superior to that of the Germans, the Italians, and the French."

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* It is believed that this rifle is approximately a 0.68 inch caliber, probably with a muzzle velocity of between 2500 f/s and 3000 f/s which should enable it to penetrate close to 1.0 inch of medium armor upon normal impact at 500 yards.

EUROPEAN IDEAS ON TANK BATTLES

France, Germany, Great Britain and Russia have tank-minded armies. Their tank training regulations and the articles appearing in their military journals refer often to combats between tank units and the procedure to be employed.

Opinion in the Red Army of the U.S.S.R. seems to be unanimous that future wars will involve frequent engagements between tanks. An article in the *Avto Bronetankovy Zhurnal* of October, 1936, sums up many of their ideas on tank combat.

"Engagements between tanks in the World War were few in number, and even these were fought in the latter part of the war (when Germany had a few German-built and captured machines). * * *

"Inasmuch as none of the world powers today neglect the use of tanks, we may safely predict that in the next war battles between tanks will be a common occurrence, and furthermore, that these battles will be fought not on a small scale, as in the World War, but on an extensive scale, with large tank formations engaged on opposite sides.

* * * * * * *

"We may assume that tank battles will ordinarily occur during meeting engagements, and that other forms of combat will involve less frequent tank battles.

" * * * Success in a meeting engagement will be contingent upon:

Securing by maneuver an advantageous firing position;
Leading the hostile tanks into an unfavorable position;
Surprise effect in the attack;
Skillful handling and control;
Efficient reconnaissance work;
Proper teamwork and the mutual cooperation of tank crews and tank elements."

This article emphasizes the advantages of firing at a halt, but admits its impracticability in many cases. How-

ever, it is possible when tanks are in ambush in rough and broken ground, and in assembly points. The rate of fire is one and a half to two times faster when tanks are at a halt.

Fixed rules governing action between tanks are not practicable. The initiative of the commander, his rapid evaluation of the situation, quick decision on the maneuver, his control over its execution, and the skill of tank crews in performing their duties are the requisites of success.

Other factors being equal—armor and armament in particular—success will unquestionably be on the side first opening massed fire. A tank-unit commander, upon receiving information of approaching hostile machines, should rapidly determine where the encounter will take place. He should also note the nature of the terrain and how its possibilities for concealment, observation, and fields of fire can be utilized to ambush the enemy.

The author outlines several methods of deploying for tank action that may be used in a meeting engagement—deployments much the same as cavalry might employ:

Entering battle from duly occupied lines of departure.

Entering battle directly from the march.

Intentionally withdrawing for the purpose of attacking elsewhere.

Containing enemy machines with a fraction of the tanks and hitting them with the greater part from a concealed flank position.

At assembly points a platoon or company should be on guard, and all other units should be in a state of readiness to repel the enemy. The best method for tank defense at assembly points is to have the tanks in a deployed combat formation, ready for defense in any direction with a definite sector for each combat unit, and with headquarters and special elements in the center. Then fire can be opened from position.

The author concludes that tank battles are inevitable, especially in meeting engagements. Success will require

maneuvering for advantageous firing positions. Ramming must not be considered.

In another Russian publication, *Motorizazja i Mechanizazja*, similar views are found. One author declares that instruction in the characteristics of the enemy's tanks, covering their advantages and disadvantages, should be a fundamental requirement for the training of tank troops. Relative speed, armor, and armament of the opposing tanks will determine the outcome. Therefore the characteristics of the enemy's tanks must be known so that they may be opposed by superior tanks.

THE NEW GERMAN ARMY

The German Army maneuvers of 1936 are discussed by Lieutenant Colonel H. de Watteville, C.B.E., in the Journal of the United Service Institution (Great Britain) of November, 1936. These were the first exercises to be held on so large a scale since 1913, and the first maneuvers of the kind to be attempted by the new German army. Moreover, "they were also the first," says the author, "at which really modern military equipment was to be used on a large scale by troops—at any rate in public. Close to 50,000 men were in the field."

The German army of today consists of two-year compulsory service men together with the professional officers and noncommissioned officers absorbed from the former *Reichswehr*.

The author states that the German army of 1936 promises to be in no way inferior to that of 1914. In maneuvers, the use of camouflage and concealment indicated a studious endeavor to seek cover from the air.

Two outstanding features of the German division impressed Colonel de Watteville. First, the 2½-pounder antitank artillery which is mounted on a shielded carriage,

has a split trail allowing wide traverse, and uses a four-wheel towing tractor. There are three companies at divisional headquarters. Second, the divisional reconnaissance unit consisting of a company of armored cars, two motor-borne infantry companies (which may later be mounted on motorcycles and sidecars), an antitank-gun detachment, a light mortar section, a machine-gun company.

The division as a whole is mechanized but many horses are interspersed among the machines. The divisional squadron of cavalry having been abolished, a troop has been given to each infantry regiment for reconnaissance and communication. Horses are also seen in machine-gun units.

The present rearmament which is to embrace 36 divisions is far from complete. Many hired vehicles were to be seen, among them gaudy red and yellow "Esso" and "Shell" tankers, poorly camouflaged with fir branches —no doubt looking like roving Christmas trees from the air.

A regiment of light two-man tanks—140 machines—worked fast and with cohesion, making little noise and suffering only one observed breakdown. Reports were current that heavier machines would soon be in use, which probably will be the backbone of the three existing —or possibly five—armored divisions.

The new motorcycle equipment is most efficient and strongly built. The silence of a section of motorcycles moving at a good speed is such as to render their passage almost inaudible to anyone standing a few hundred yards to windward.

Infantry units carry tripods, intended for use with light machine guns against low-flying aircraft. These were frequently seen set up in positions of readiness.

The author describes the organization of the German division.

"*Composition of the new German Division*:
Headquarters.
3 infantry regiments.
1 armored car regiment.*
1 reconnaissance unit.*
Artillery:—
Headquarters.
1 regiment of field howitzer (3 groups of 3 batteries).
1 medium artillery detachment.
1 antitank company.
1 troop field gendarmerie (M.P.'s).
1 signal group.
1 pioneer battalion.
Composition of an Infantry Regiment:—
Headquarters (with 1 troop cavalry).
3 battalions of each—
3 rifle companies (27 light machine guns).
1 light mortar company.
1 heavy machine gun company."

EXTENDING THE USE OF TRAINING FILMS

An interesting article by N. Kudrin in the Soviet journal *Avto Bronetankovy Zhurnal* of October 1936 advocates a more extensive application of training films in the Russian Army where they already are widely used. The author would have films used in the training of tank crews. He says there is no reason why tank crews could not be seated in the training tank found in each tank unit, and see a motion picture film depicting the combat situations which they would encounter in actual warfare.

For example, consider the training of a tank crew in the operation of the leading tank of a reconnaissance detachment. With pictures there could be unfolded before

* These two seemed to work as a combined unit.

the eyes of the crew the route to be followed. All the topographical features would be seen as they would be in actual practice. In sound films the motor would be heard. Suddenly something happens—there's an obstruction, or a hostile tank appears, or a hostile gun fires. The film may then be stopped while the instructor calls upon the tank crew for decisions and orders. The driver changes gears, puts on brakes, turns, reports targets seen or the like, as the situation demands, or the tank commander gives orders to the driver, signals to the platoon comcander, or instructs the gunner.

Other training exercises could be carried out in a similar way. The work of tanks and infantry advancing together could be taught. Thus the young member of the Red Army will gain an idea of an actual attack, says the author.

The film is a highly effective medium for tactical training, affording economy in training time and in equipment.

AIR INFANTRY

(A digest of foreign experiments and theories which are given here to stimulate thought and discussion.*

One of the great factors in the next war will be aircraft. —Marshal Foch

Paralysis, rather than destruction, is the true aim in war, and the more far-reaching in its results.

—Liddell Hart

The doughboy has extended the horizon of his foot-slogging days by taking to wheels and tractors. Not content with that, today he is growing wings and looking into the blue—at least in two European armies. For Russia and France already have elite units of air infantry.

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* Data on experiments are taken from various military periodicals. Their accuracy cannot be assured, but is believed to be correct.

When Soviet experiments with aerial landing operations via parachutes first were broadcast, they were derided as fantastic follies. Since then France has organized two groups of "air infantry." Watching these parachute infantry units and their maneuvers are the other European armies, all keenly interested. Meanwhile the advanced thinkers of these armies express themselves both for and against infantry's third-dimension expansion. Indeed, the entire world is interested. One cannot avoid being impressed by the dazzling potentialities of a "winged army." Perhaps "vertical envelopments" are to become the future concept of maneuver. At least this novelty is worth examining, if only briefly. Let us survey then what actually has been done in this field, and afterwards turn to the theories voiced by the advocates in infantry sky-riders.

SOVIET RUSSIA

The Army of the U.S.S.R. is the pioneer in launching infantry air attacks. In the maneuvers of 1935 and 1936 between 5,000 and 6,000 troops were carried behind the "enemy lines" by transport planes and planted where they could wreck the hostile rear. At the 8th Congress of Soviets on 29 November, 1936, it was asserted that 2,200 parachutists had been dropped at the Moscow maneuvers, followed by a landing of 3,000 with machine guns and small cannons. This movement, according to the German *Militar Wochenblatt* was made over 260 miles and was a complete surprise to the enemy whose main radio message center was attacked and captured.

Major Eggebrecht, writing in the *Militar Wochenblatt* of 4 October, 1936, states that the Russian Army has 60,000 men trained and equipped for parachute operations, and a civilian reserve of 600,000.

The French *Revue de l'Armee de l'Air* of September 1936 contains an interesting article on the medical aspects of parachutism. It relates that in Russia during

the first seven months of 1934, 10,000 parachute jumps were made; in the first seven months of 1935, 40,000 (close to 70,000 annually). The total for 1936 undoubtedly was even greater. At the Russian military academy "Frounze", the professor of parachutism trains officers to become parachute instructors; at the airdrome he continually organizes new parachute squads. Recently, jumps have been made by men carrying skis, or bicycles, upon which they speed away to a rallying point after landing. In Russia an incredible enthusiasm for parachutism exists; men, women, and children practice jumping from towers. It is a national sport.

The Infantry Journal March-April, 1937, reviews an article in the French *Revue d'Infanterie* of December, 1936, which describes the Russian conception of air infantry and vertical attacks. We quote excerpts from this review.

"Much effort is directed toward reducing the weight of equipment, arms and the reserve ration. Each soldier wears a special uniform and carries a musket or light machine gun in a case.

"Small groups can be landed deep in hostile territory to carry out espionage and propaganda missions,* ... destroy vital points in rear areas, carry out surprise attacks on command posts. Larger detachments can seize definite objectives or attack the rear of enemy reserves or defensive positions. * * * The landing of these detachments.... Must be carefully regulated both as to time and place.... Groups of 25 to 35 men are launched in successive waves. The first parachute to hit the ground becomes the objective of the others. To avoid excessive dispersion, 'chutes are not opened until near the ground.

"The landing should be preceded by an aerial reconnaissance and should be protected by pursuit ships to

* During the World War both the Allies and Central Powers sent individuals by air to blow up ammunition dumps, airdromes and factories. These agents were set down by planes in the vicinity of their objectives.

assure air supremacy in the landing zone. Bombardment planes should neutralize or destroy nearby hostile defenses."

The first elements to land establish a zone of security around the landing place, after which larger detachments are landed in successive waves.

In the 1935 maneuvers near Kiev the Blues were stopped. The Blue commander decided to carry out an aerial landing in the enemy's rear area at a point 13 miles behind the front.

"After assuring the aerial protection of the landing by pursuit and bombardment planes, some 30 powerful transports carried forward an advance guard of about 600 men with the mission of providing the immediate security of the detachment. These men were landed from about 2,300 feet. Immediately after the advance guard had landed, a second arrival of planes poured out 600 more parachutists as a first support. Then additional aerial formations appeared carrying the main body of the detachment. These ships came in by successive waves and landed. * * * As soon as the troops had piled out, the planes took off to leave the field free for the next wave. Each wave brought in a thousand men. In a half hour the debarking of the entire detachment had been completed. Supported by the aviation, this force, numbering about 6,000 men, drove forward against the enemy rear. Vital points destroyed and key installations overrun. The Blue commander had cracked the nut."

The following editorial in the United Services Review (Great Britain) if March 4, 1937, indicates that the landing, reforming, and subsequent action of parachutists is not as simple an operation as it appears on paper. Conjecturing upon the amount of troops transport by air which may be seen this year in the maneuvers to take place about Singapore, the editors of this periodical say:

"In any case the Russian parachutists need not fear that we shall rival their performance in the Red Army maneuvers last year. Some military observers who were

much impressed would have found an unhappy reverse to the picture in the confusion that ensued as the airmen came to ground. Not only were units hopelessly mixed up, but reserve ammunition and rations failed, so that fliers, if under real war conditions would have been simply thrown away.

"Another comment on the parachute maneuvers drew attention to the "good shooting" offered by the descending fighting man as he gyrates slowly to earth. It may not be long before our humanitarians will decide that it is unsporting to shoot a man as he lands, as bad as shooting a sitting bird. It is, moreover, unlikely that we should expose our troops to the chances of alighting in a shark infested sea."

The trenchant comments of the editors are well directed. But, isn't it true that all battlefields are "shark-infested", any exposed individual is "good shooting", and that there is always some confusion among troops when they land from any transport—horse, rail, or motor? Isn't it too early to condemn arbitrarily parachute landings as no good? The idea seems to deserve further experimentation.

FRANCE

France has two groups of air infantry or parachute units, each consisting of a light infantry company and a squadron of transport planes. One group is stationed in Algiers, presumably with an eye toward their utility in the event of tribal outbreaks threatening frontier garrisons of Algeria or Morocco. The other group is at Chartres in continental France.

The probable employment of these units was discussed by Lieutenant Colonel Desre in *La Revue d'Infanterie*, February, 1936. This article was reviewed in the Command and General Staff School Quarterly of September, 1936. The quotations below are taken from this review.

"There are two probable missions of these units in

wartime: (a) covering missions, and (b) destruction missions.

"As a covering force a parachute unit might be dropped where it could protect the landing of troops by air transport in rear or on the flank of the enemy position. Again, a large scale offensive operation aimed at distant objectives, and using mechanized forces, might require at a given time the possession of a crossroads, defile, or other important terrain feature.

"As for destruction missions, innumberable tasks can be visualized in rear of the enemy lines, which would be suitable for parachutists: * * * bridges, railway nerve centers, factories, aviation materiel, dumps.

"Ground combat is essentially infantry combat, except for demolition work, and therefore parachute units should be considered as infantry units transported by air to the scene of action. It would seem that parachute units should be organized along the following lines:

(a) Companies organized from officers and men taken principally from infantry units with a fraction from engineer units.

(b) Attaching these companies to air corps bases.

"A suitable organization for the company would be three light platoons, each of three combat groups, with two machine rifles each instead of one; and one heavy platoon containing a machine-gun section and a cannon section with two 37-mm guns. The latter would be used against combat vehicles which might be expected to be the first combat elements against which the "chasseurs parachutistes" would come into contact.

"The instruction of these units is a marvelous field for the ingenuity and initiative of young officers, with two general courses to be developed; one in aerial jumping, the other in ground fighting.

"The former would first require instruction in the technique of jumping with an automatically opening parachute, then with a parachute controlled by the individual. Later the aerial instruction would concentrate on

ground jumping; that is, leaving the transport plane at regular brief intervals so as to quickly reform on the ground.

"Ground training should specialize in defensive combat, rapid reorganization and deployment in any direction, powerful fire development, and the utilization of small, natural terrain features of defensive value as a means toward effectively meeting mechanized attacks, which seem the most likely initial threat to parachute units.

"In addition to the forming of these two companies, the Minister of Air has already taken steps toward organizing pre-military instruction in "parachutism", designed to facilitate recruiting in these units by arousing youthful enthusiasm for this sport and familiarizing candidates with the technique of parachute jumping.

"If the experiment succeeds, rumor says that three other companies will be organized so that there will be one in each "air region" of France and one in North Africa."

BRITISH OPINIONS

We have briefly surveyed the Russian and French experiments with flying doughboys. Let us turn to the British, who have long made considerable use of airplanes for the transport of both men and supplies to distant outposts of their colonial frontiers, and to carry expeditionary forces rapidly to scenes of revolutionary outbreaks. So far as is known there are no parachute units in the British army, although there have been numerous advocates who have proposed the creation of "winged Tommies." Among these are Major General H. Rowan Robinson and Major J. T. Godfrey.

The former expresses his views in The United Services Review (British) of December 17, 1936. He says, "It would seem... that this is one of the military opportunities created by aircraft. Armies can hold but cannot

attack. Aircraft can attack but cannot hold. Here they are effectively combined.

"Generally speaking, the projects may take one of four forms:—(a) a decisive destruction, (b) a raid, (c) battle action, (d) reinforcement.

"In the first three cases the landing would be in hostile territory, in the fourth on friendly territory. If (a), (b), and (c) could be solved, therefore, (d) would present no difficulty.

"A major operation (a) would usually aim at capturing and holding... an important junction of communications. Ground suitable for an aerodrome would have to be selected, the area around it carefully photographed, and plans laid so that each successive body of troops on landing know exactly where to go and what to do. In a major operation, two conditions are essential to success: a marked air ascendancy over the selected locality and a close timing in connection with the main operation which the landing was designed to assist."

A raid would be a simpler affair. It might range in strength from a single man, dropped for intelligence purposes or for cutting wires, to a demolition party covered by two companies of infantry on foot or on cycles. Raids generally would be more effective if timed to assist and be assisted by other operations. The raiders might expect rough handling during or after the execution of their task.

"We cannot dissociate ourselves from this idea," concludes the author, "for it is a novel and promising application of the unchanging strategy which has for foundation the attack and defense of communications. The sooner, therefore, we undertake the necessary experiments the better."

Let us turn now to "Winged Armies" written by Major J. T. Godfrey, R.E., in the Journal of the Royal United Service Institution, August, 1935. Major Godfrey's work deals with so-called "air brigades" of mobile troops and omits mention of parachute units which the Russian and

French look upon as the advance guard echelon of "air brigades."

"Communications are," writes Major Godfrey, "by common consent the Achilles' heel of armies as at present constituted, and to cut them effectively must be regarded as the master stroke of strategy." Upon this statement he bases his discussion, of which the salient points are here given.

Attacks on communications should attempt to elude the enemy en route. An air-borne force has much greater scope for avoiding opposition than a land force. The problem resolves itself into conveying troops, modifying their equipment for the new *modus operandi*, and providing adequate security for them.

Local air superiority is essential. Concealment may be obtained also by setting out during darkness so as to land just after daybreak. Protection en route would be performed by air guards flying nearby fulfilling the missions performed by advance, flank, and rear guards of a land force. The basis of the whole argument for this form of air-borne attack is that it goes beyond being a mere raid and extends the strategy of "rear attack" by the application of air transport. Even if only partly successful, a blow can be struck that is worth the expenditure of a considerable part of the air strength.

To ensure being able to land, a landing ground must be carefully selected which—

(a) Is reasonably close to the main objective of the attack;

(b) Is remote from large concentrations of ground troops since an air-borne attack must, in its early stages, avoid serious resistance.

If the air brigade has the mission to cut and block an artery of supply, at a railway junction, for example, it must throw out an all-round defense about the central landing ground and objective sufficient to protect them from observed field-artillery fire. Assuming that a six-mile radius is depth enough to secure this condition, the

perimeter of the area held would equal about 36 miles. While this may appear to be an imposing task, it must be remembered that the attack will be launched by surprise at a distance from known enemy troop concentrations. Moreover, the perimeter can in great part be held by a thin line watching roads and other approaches. Finally, the air guard is part of the force and must give warning of hostile approach and also delay the approaching force.

The air brigade must be strong in fire power and mobility, which makes machine guns and antitank guns, both provided with motor carriers, a prime requisite. Naturally, all must be lightly built—vehicles weighing no more than a ton, preferably less. One large plane should be capable of transporting three weapons carriers.* A suggested tactical unit would be a "section" of four machine-gun carriers, a mobile antitank gun, and a commander's vehicle (a fifth machine-gun carrier with radio): total, six vehicles, carried in two planes. Eight of these planes would constitute an "air platoon" of four sections—24 vehicles, 16 machine guns, 4 antitank guns, 4 command vehicles.

Allotting a mile of the 36-mile perimeter to each section, 36 sections would be required. If a 25-per cent local reserve were provided, a total of 45 sections would be needed the first day of the operation—ample to ward off attacks until reinforcements arrive. Such a force would have over 200 machine guns, including those in command vehicles, and 45 antitank guns; this with its 300-odd light weight carriers, and additional vehicles—about 360 in all—would be a veritable "air brigade."

To carry it in one trip 120 transport planes would be

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* In Ethiopia the Italian army transported by air the necessary supplies for entire army corps. "Caproni 133" planes with a wide range and capable of carrying 5,500 pounds were used. By reducing the safety factor from 6.50 to 3.0, the carrying capacity was doubled. It was proved that the airplane now takes its place among the military methods of transport.

needed, each with close to a three-ton capacity. Or 60 planes could carry it in two trips. A hundred mile move could be completed in six hours if two trips were made. Even a third trip could be made the same day carrying supplies, tools, ammunition, explosives, a company of cyclists, and some motorcyclist dispatch carriers.

To preserve secrecy "emplaning" should take place at different starting points, the concentration taking place in the air.

This military "cell" would thus be planted like a tumor on a nodal point of the enemies' arteries and maintained there until it had starved the part of the body fed by them. The advance guard would constitute the "landing head," moving rapidly to areas on an inner perimeter, which had been predesignated and learned by all individuals from a study of aerial photographs and sand-table models of the landing site. Subsequent elements—the main body—would leapfrog the existing line and establish a larger perimeter, progressing until a six-mile radius had been reached. When the entire force has landed it numbers no more than a skeleton battalion but has the defensive fighting power of six ordinary battalions. While these mobile troops are blocking routes and establishing combat groups, the demolition party is at work effectively destroying all the main communications in the area.

The first day of the operation would probably involve local combats, easily repelled by the rapid intervention of the reserve. However, major attacks upon the "cell" should be unlikely, owing to its establishment far from known enemy troop centers. From the second day onwards, though, enemy activities undoubtedly would increase, particularly from the air. Further landings of reinforcements would be increasingly difficult, but the cell could be made reasonably self-supporting, at least for two or three days, against attacks by local troops. For that period, Major Godfrey believes, it is unlikely that the enemy would be persuaded to deplete his front-line forces or main reserve with a large enough force to

crush the cell. However, this last is questionable. If the threat is as great as Major Godfrey expects it to be, there is every likelihood that prompt action will be taken to eject the air raiders.

Granting, for the moment, Major Godfrey's main premise, close to two battalions of men having the defensive armament of a brigade might be landed in a cell in three days. It should be possible to maintain this force for perhaps a week during which time all communications within a radius of six miles would be destroyed.

Strategically, it would be desirable to establish two or three of these cells on parallel enemy communications leading to the front and preferably between the enemy's main reserve area and the flank which the main land army plans to attack. If overlapped these cells could employ a common central reserve of great strength. As attacks on the cell increase to an intensity making static defense difficult, the commander can, by fighting a delaying action, move his cell in a direction where there is little opposition. His only concern is to keep his cell astride the same railway or other communications that have been severed, and thus keep an artery cut. Not till pressure from two or three directions becomes heavy is the cell's life in danger.

By this time, the enemy's situation in this area should be desperate, and our land forces on that flank should be ready to make a general attack. The enemy forward troops would find themselves attacked in front, hemmed in by machine guns in rear, and without ammunition or supplies needed to combat either force. The starved flank should crumble and fall.

The author admits that the establishment, maintenance, and operation of a cell are not likely to proceed as easily as described. The enemy may be on guard against such an operation and, besides attacking it in the air, may have a force in motors ready to meet it when it lands. These motor-transported troops may begin to arrive within an hour. Here is where the air guard must cooperate

with the cell or air brigade on the ground, and block or delay the approaching forces, while the cell units prepare to meet the attack.

Should attacks from two or three sides be delivered with such intensity as to endanger the cell, and "air withdrawal" can be made. The brunt of such action would of course fall upon the rear parties covering the "vertical movement." However, with their motors they should be able to get away from the scene of their final action to a prearranged landing field several miles away, and there have fifteen or twenty minutes grace in which to "emplane" and fly away.

Criticism of the glib reference to landing and taking off is well justified, admits Major Godfrey. However, if the slow-landing capacity of large aircraft—on the autogiro principle—is solved, small mediocre fields can be used. Every advance made in this direction adds to the importance of the air-borne method of attack.

Air brigades similar to the type outlined may become the supremely mobile though unarmored arm of the future. Their objective may include factories, industrial railways, relief of distant garrisons, reinforcement of isolated detachments.

Major Godfrey concludes his study, of which only the high points have here been given, by a glance into the future.

"Are we not," he says, "on the brink of a deeply significant change? If air transport for ground troops is perfected, can we not organize small but supremely energetic forces, endowed not only with a tactical speed (by motors) of twenty to thirty miles an hour, but a strategic speed of nearer one hundred miles an hour? * * * In modern war the placing of some troops in a desired area first is a strong trump card; owing to their delaying power, they can make time for the arrival of slower-moving main forces. If that time is not created, the main forces may be compelled to attack under disadvantageous circumstances, and the cost of the whole

business in men and materials rises enormously.

"The air-borne cell method appears also to be applicable to the seizure of a land base in hostile territory. If the central landing ground is situated on the sea coast, a semi-perimeter could easily be reached within a day which would guarantee a thoroughly defensible "beachhead"—or indeed a number of them, since with the vehicles provided, a withdrawal is possible. A commander planning a descent on a certain coast could add feint landings to his list of surprises, and divert his main force, following in ships in the usual way, on to whichever of these preliminary landings offered the best advantages.

"Once the principle of air-borne forces *equipped with vehicles* is conceded as a valuable adjunct of more ordinary methods, many other opportunities for their use may arise. * * * Since forces of a higher mobility must in the end reduce slower-moving troops to second place or even worse, he who can first wield such forces in practice should reap great advantages in time of war."

OBSERVATION AVIATION

As this volume of the Mailing List goes to press, all great powers are making vast increases in their military air strength. The War in Spain is characterized by extensive air operations on the part of both adversaries. The Italian success in Ethiopia can be attributed largely to the effectiveness of the Italian Air Corps in reconnoitering, attacking, and providing rapid transport where ground transport was impossible. The air arm has become an indispensable auxiliary of ground forces. Therefore it behooves infantry officers to know in general terms how aviation cooperates with infantry. Our interest is primarily with observation aviation, which may operate directly with an infantry division.

Observation aviation working with an infantry division has several missions to perform: infantry mission, artil-

lery mission, reconnaissance mission, and command mission.

The infantry mission is to observe over the area of contact and to keep the commander informed of the dispositions of friendly and hostile troops in contact.

The artillery mission includes all observation of artillery fire, adjustment, surveillance, and fire on fleeting targets.

The reconnaissance mission covers the hostile rear areas to the line at which corps observation takes over responsibility. Normally it includes the light artillery and division reserve positions.

The command mission covers emergency missions which usually involve obtaining or confirming vital information.

Observation aviation reports only what it sees (or does not see) and when and where it sees it. It does not interpret information. It differentiates carefully between fact and opinion particularly in regard to negative information.

Visual reconnaissance is supplemented by photographic reconnaissance, the results of which may be made available to all subordinate units through the issue of vertical or oblique photographs.

Observation aviation is not designed or equipped for combat missions. Attack, Pursuit, and Bombardment do the fighting.